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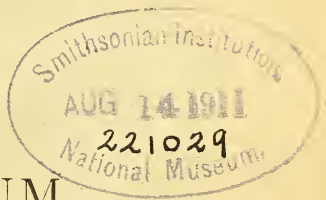
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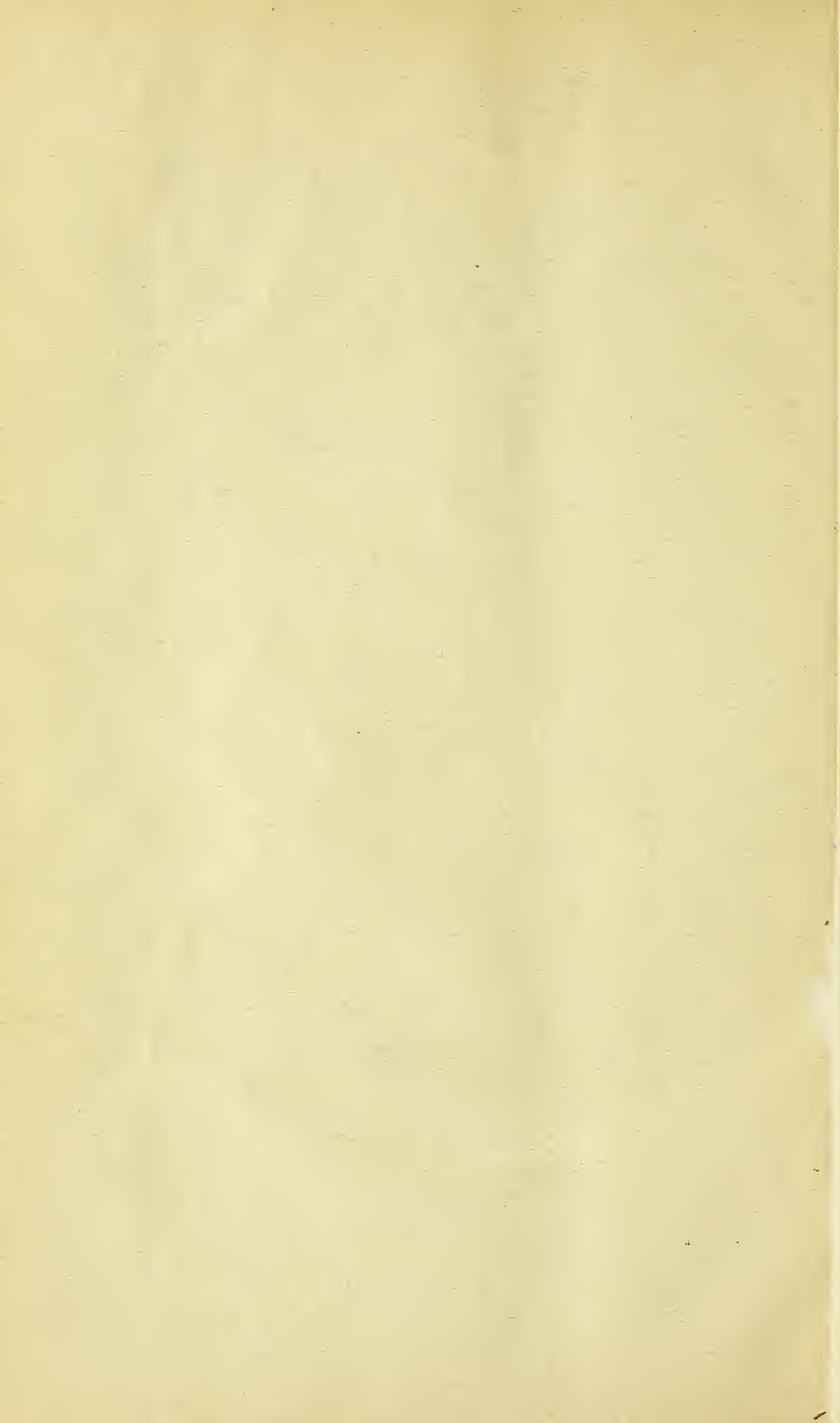
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BLADWIJZER VAN DEEL I.

PRETORIA  
THE GOVERNMENT PRINTING AND STATIONERY OFFICE





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22/029

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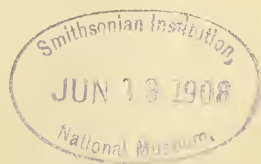


ANNALS  
OF THE  
TRANSVAAL MUSEUM.

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APRIL, 1908.

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ANNALS  
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**A SHORT HISTORY OF THE TRANSVAAL MUSEUM.**

By Dr. J. W. B. GUNNING, Director.

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In sending the first number of the Annals of the Transvaal Museum out into the world, it may be of some interest to review the history of this Institution.

In 1892 the Government of the late South African Republic, at the initiative of the State Secretary, Dr. W. J. Leyds, decided to found a State Museum for the Republic in Pretoria, and appointed the following gentlemen as a Board of Management or Trustees, "Curatoren": Dr. N. Mansvelt, Dr. G. S. W. Lingbeek, Dr. H. G. Breyer, Dr. Fockens and Geo. Leith, Esq.

Of these gentlemen, the Superintendent of Education was *ex officio* Chairman, and the Institution resorted under his Department.

At this period there existed no public collections of the Fauna, the Flora, or the Ethnography of the Transvaal, and it was the first aim of this Institution to collect these objects as well as exhibits of historical and national interest.

Whilst the first aim was the scientific exploration of the State and the making and preserving of scientific collections as the natural outcome of such explorations, the second and not less important aim was practical aid to education.

The Department of Education, under the guidance of Dr. Mansvelt, had erected many new schools, of which the "Gymnasium" or College, the "Model School" for boys, the "High School" for girls, the "Normal School," and the "School of Mines" were the most important.



*Plate 1.* HALL No. 1.—South African Birds; in the centre cases a few Economic Plants, Under the shades, Egg Collection.





HALL NO. 2. South African Mammals.

Teaching in Zoology, Botany, Mineralogy and allied Sciences was much impeded by the want of books suitable for South African schools, and ocular demonstration of the objects of Natural History in the Museum collection was to assist in the teaching of these subjects, where handbooks were often of little value.

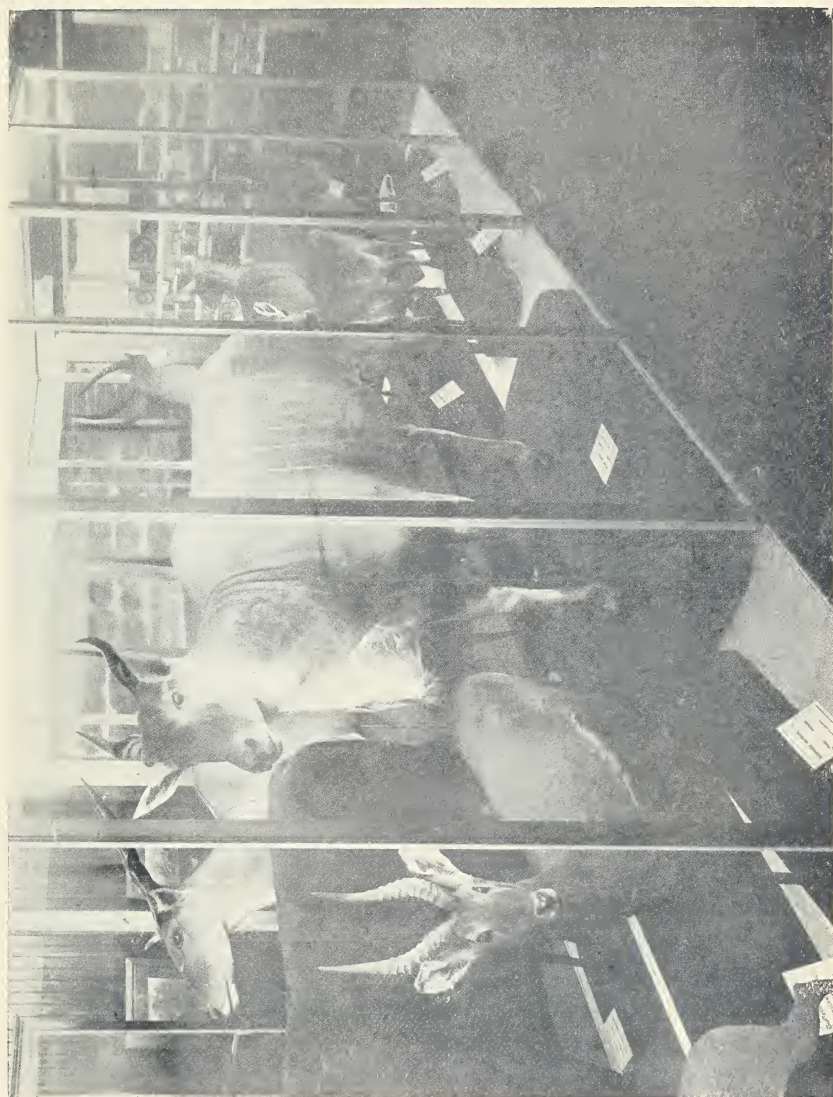
Of course, systematic collections of all animals, plants and minerals, to be found within the boundaries of the Republic were to be made for systematic scientific work, but with the educational object in view considerable sums of money were spent to procure types of families and groups of Mammals and Birds which do not occur in South Africa, but which are mentioned in the handbooks in use here at the time.

Later on a very extensive collection of minerals and fossils was purchased by the Museum to serve with the instruction in Mineralogy and Geology in the School of Mines. This collection is at present on loan and temporarily embodied in the collections of the Geological Survey.

The second and certainly not less important aim with the founding of the State Museum was the fostering of the love of the country, the stimulating of the national pride, the encouraging of the consciousness in the people that this State was but a part of a homogeneous complex of States and Colonies in South Africa, that the past of all these countries was the same, that the great men and great heroes of each component part belong *ipso facto* to the remainder, that origin, present and future, were and should ever be one and the same.

In order to portray the past clearly before the mind's eye of the present and future generations, in order to instil love and respect for those who helped to shape the destiny of the South African nation as a whole, great attention was to be paid to the collecting of historical relics, first of all in connection with persons and matters of this country, and further in connection with all South Africa.

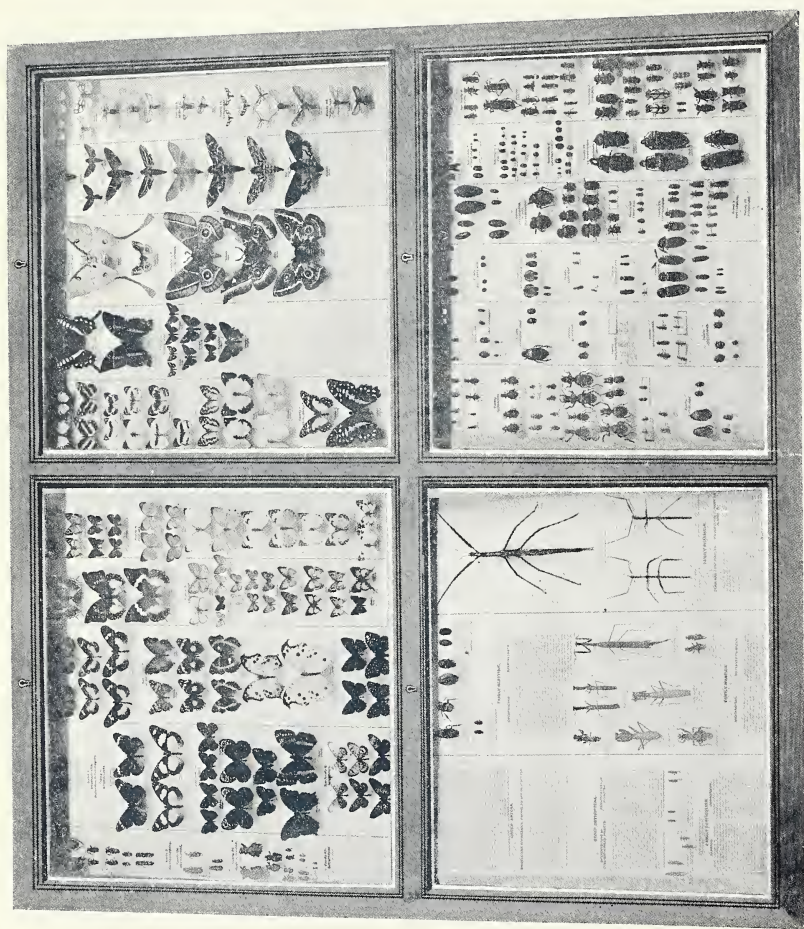
We, therefore, find that all appeals made to the public for support, and all circulars issued during the first years of the Museum's existence lay special stress on these main thoughts : the Museum shall be *Educational* and therefore be in constant touch with teachers and pupils which it shall reach through the Education Department, and the Museum shall be *Historical*, i.e., it shall show the history of the past, and by fostering love and respect for a glorious past shall be instrumental in building up a noble South African nation.



*Plate III.*

HALL No. 3.— **S. A. Mammals, Reptiles and Fishes.**





HALLE No. 4.—**Insects.**



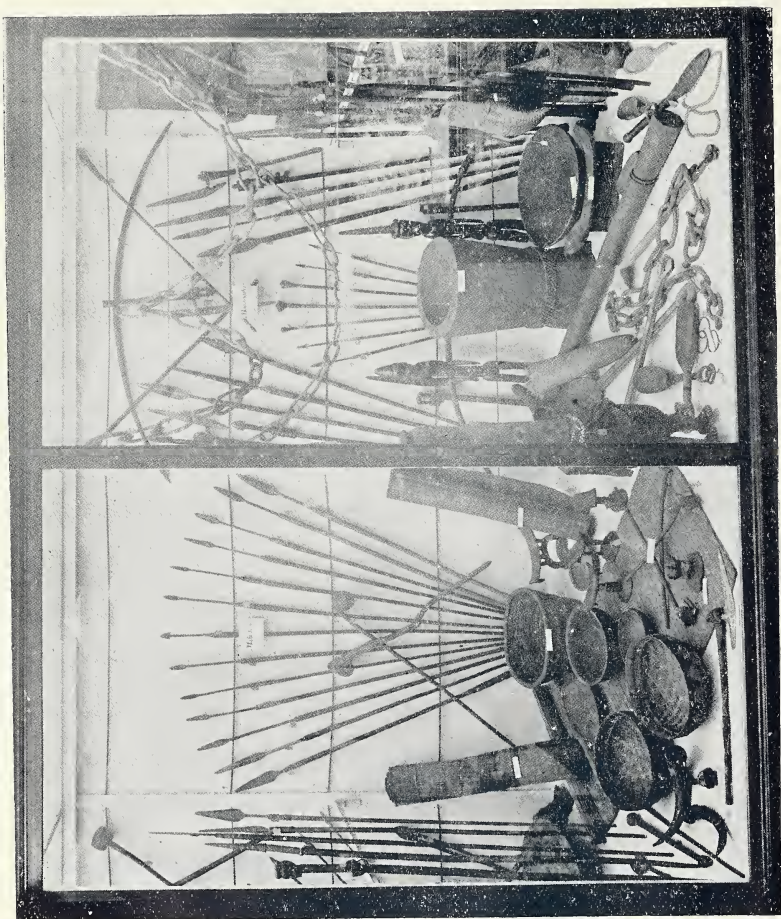
During the first years great difficulty was experienced in securing the services of a suitable person as Curator to the young Institution. The collections were yet too small and unimportant to warrant the appointment of a qualified Museum expert, yet the interest that was manifested by the farmer population especially made the collection extend so soon that judicious organisation and scientific classification of the many objects became an absolute necessity. At last one of the members of the Board of Management, Dr. H. G. Breyer, accepted the honorary Curatorship and the name of this scientist, who had done so much for the sake of education as member of the teaching staff of the "Gymnasium" and as Director of the School of Mines, was sufficient guarantee that henceforth the work of the Museum should be performed and led in a thorough and scientific way.

Soon, however, the work became too much for an Honorary Curator, who necessarily could only devote a few hours a week to the work, and a permanent Director was appointed in 1896, when Dr. J. W. B. Gunning undertook the duties of the newly created post.

A few months later Mr. Swierstra was appointed Entomological Assistant, and Miss Leendertz Botanical Assistant; Dr. Gough joined the Museum Staff in 1906 as Assistant for Lower Vertebrates and Invertebrates except insects.

With the exception of the mounted collections above referred to, all the exhibits were mounted in the Museum, first by Mr. Wilde, after him by Messrs Krantz and Griffin; Mr. Noome, who is at present the only Taxidermist, joined the Museum in 1897.

When the Museum was started the collections were housed in a small room next to the clock-room in the top storey of the Government Buildings, but this room very soon became too small and besides it was not easy of access to visitors, and the small Market Hall in Market Square was then hired and the collections transferred thither. Here the Museum remained till 1902; the new building at present in use was commenced in 1899—the foundation stone was laid by the Superintendent of Education on the 22nd July, 1899—but the unfortunate war interfered with the building operations, which were not completed until 1902, when it was opened to the public by the Acting Lieutenant-Governor, Sir Richard Solomon, on 15th December, 1904. During the last years of the old Government the Institution had a yearly grant of



*Plate V. HALL No. 4.—Corner of Ethnographical Collection*

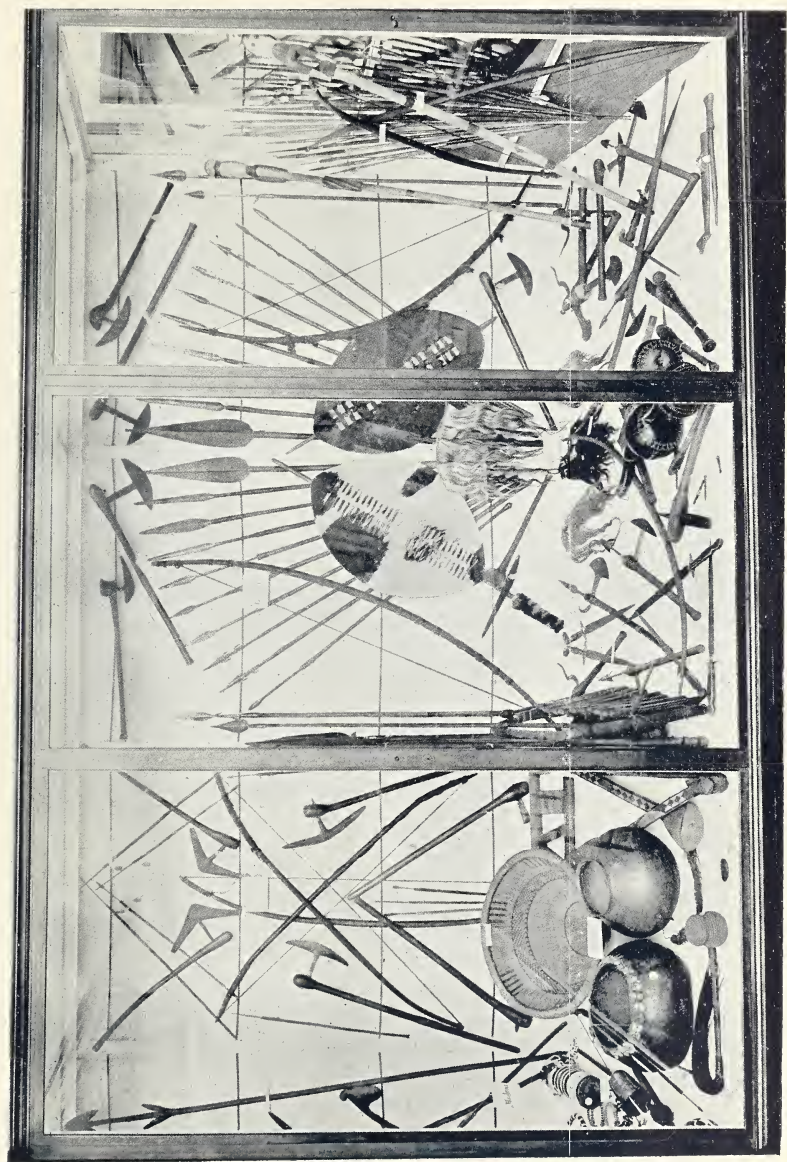


Plate VI.

Portion of Ethnographical Collection.



£6,000, and a substantial part of this sum was used in procuring a good nucleus of a Library, that most important part of any museum in which it is intended to undertake sound work.

The collections which are at present accessible to the public are exhibited in six halls; the first contains the mounted South African birds, their nests and eggs; the second and third, the mounted South African mammals, reptiles, amphibians and fishes, and in one case an exhibit is put on view of the most important internal and external parasites that cause so much damage to the flocks of the farmers in this Colony, which is to be regarded as the nucleus of an Agricultural Museum. Room four contains part of the historical and ethnographical collections and coins, room five non-African birds, and room six the non-African mammals.

The collections of vertebrates consist now of:—

*Specimens.*

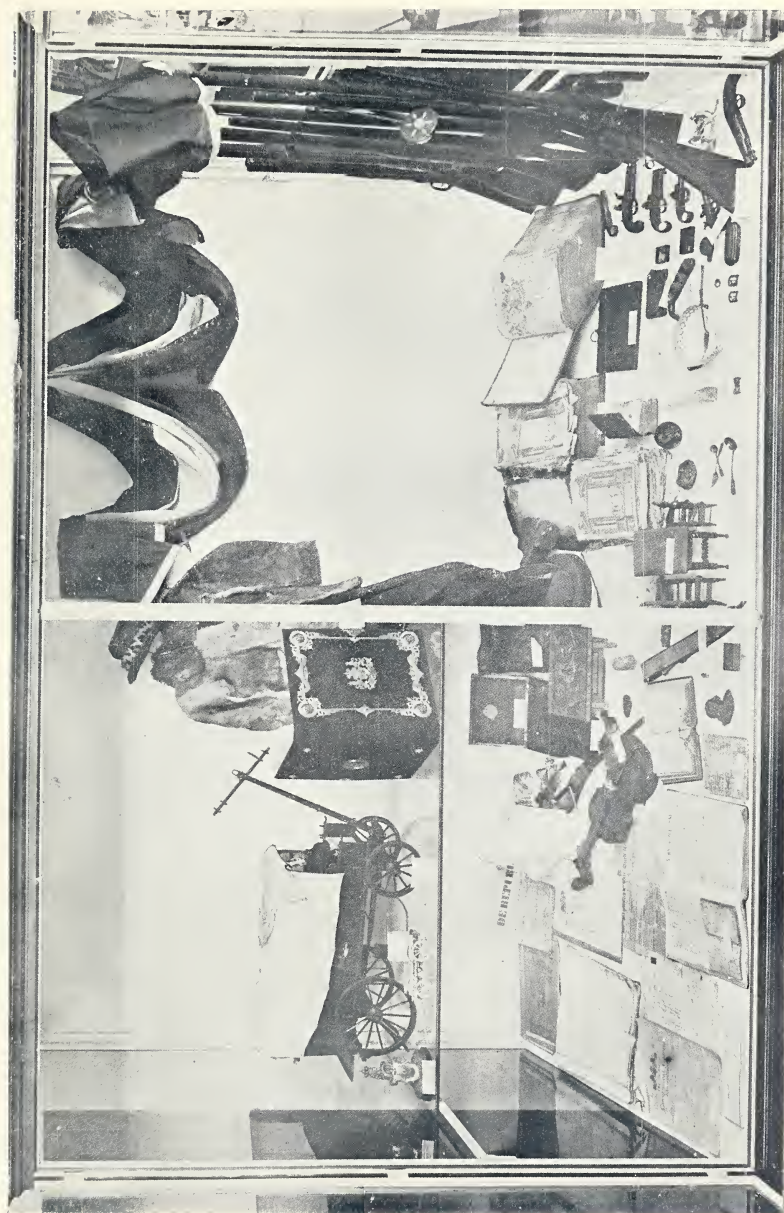
South African mammals	..	259
„ „ birds	..	1,035
„ „ bird skins	..	3,703
„ „ reptiles—		
snakes, <i>circa</i>		620
lizards	..	600
„ „ batrachians	..	200
„ „ fishes, about	..	80
Non-South African mammals..		190
„ „ „ birds	..	168
„ „ „ reptiles, <i>circa</i>		500
„ „ „ bird skins		590
„ „ „ batrachians,		
<i>circa</i>	..	20
„ „ „ fishes, <i>circa</i>		400

All specimens are card catalogued, and it is intended to publish in every subsequent issue of the Annals part of our catalogues.

Through want of space the whole of the collections of Conchylia, the Mineralogical and Palaeontological, the greater part of the Historical and Ethnographical and coin collections are stored away, as is also the large and interesting collection of Crania.

The Entomological collections are likewise not accessible to the general public. Over 125,000 South African specimens





**Historical Exhibits.**



*Plate VIII.*

**Non-South African Mammals,**

are named and classified, but want of cabinets and space prevents the scientific classification of the thousands of exotic insects which have been acquired by exchange of our duplicates with European and other Museums and private collectors.

The important Herbarium, consisting of over 4,000 named, mounted and classified Transvaal plants, is housed in a small room at the end of the exhibition halls, whereas the reference library is, for the same want of space, divided in the Director's, Entomological, Botanical and Herpetological rooms.

In response to often repeated requests it has been decided long ago to start with a yearly series of Museum lectures in order to popularise science and to make the valuable collections more useful in an educational way, but as no lecture hall exists in the building this idea had to be abandoned for the present, as the carting over of specimens to a suitable hall in town would expose the specimens to too many dangers.

In the store-rooms and cellars a large number of South African mammal skins is stored away, partly for reference and study, partly for mounting when space, time and money allows.

In issuing the first number of the Annals of the youngest South African Museum this Institution recommends itself to the kind and collegial co-operation of the older South African and of the other Museums of the World.



**Further Observations on the *Chrysochloridæ*.**

By R. BROOM, M.D., D.Sc., C.M.Z.S.

In a recent paper entitled "A Contribution to the Knowledge of the Cape Golden Moles," I endeavoured to give a systematic review of the genus *Chrysochloris* so far as it was known to occur in South Africa, and I pointed out how imperfect our knowledge still is as regards some of the imperfectly described species of the old writers, and even as regards the distribution of some of the well-known forms. Gradually, however, more and more is becoming known, and the most recent important advances we owe to Dr. Gunning, of the Transvaal Museum, through whom a new species has been found and, what is perhaps of equal importance, the re-discovery apparently of *Chrysochloris albirostris* of Wagner.

**CHRYSOCHLORIS GUNNINGI, N. SP.**

Until recently the only specimens of *Chrysochloris* known to have been found in the Transvaal were obtained at Wakkerstroom, just over the Natal Border, and they belonged to a Natal variety of *C. hottentota* which I had named *C. h. longiceps*. In December, 1907, Dr. Gunning obtained from Woodbush Hill, Zoutpansberg, a specimen of a Golden Mole which he sent me for determination.

As might be expected from its occurrence so far from the habitat of others of the genus, it has proved to belong to a very distinct new species, which I have much pleasure in naming after Dr. Gunning.

In general appearance this little mole is not unlike the typical reddish forms of *C. hottentota*. The back is dark reddish-brown, but more lustrous than in *C. hottentota*. The abdomen is lighter reddish-brown; the breast and throat still lighter. The cheeks are yellowish-brown, owing to the deep fur being yellow. There are no white hairs anywhere on the face.

In the front foot the 3rd claw is much slenderer than is ever the case in *C. hottentota*, but the relative lengths of the claws are fairly similar. As the skin had been dried, no satisfactory description can be given of the nose pad, but it does not seem to differ much from that of *C. hottentota*.

The length of the specimen, measured in the flesh, was 126 mm. and the hind foot 15 mm. The sex, female.

The specimen was captured on 7th December, 1907.

Unfortunately the skull has been badly injured, but as the tooth-bearing portion had been left in the skin, enough remains to remove all doubt as to the distinctness of the species. The teeth are 40 in number, thus differing from *C. hottentota*. But apart from number they differ greatly in character. The incisors present no striking characteristics, though the second is not so high as in the *C. hottentota*.

The canine, though small, has a distinct posterior small cusp. The 1st premolar is much larger than is ever the case in any variety of *C. hottentota*, even than in the gigantic *C. h. longiceps*, and it is distinctly molariform.

The other two premolars are shorter antero-posteriorly than in *C. hottentota* but much wider, and resemble more those of *C. asiatica*. The lower molars differ from those of *C. hottentota* and *C. sclateri* in having the posterior talons rudimentary.

In the last two premolars there is a minute talon, in the first molar only a rudiment, and in the last two molars no trace. The following are some of the chief measurements: Dental series 12 mm. (*cf.* *C. hottentota* 8·7–11, *C. sclateri* 9·6, *C. asiatica* 10, *C. villosa* 13·3); molar series 6·7 mm. (*cf.* *C. hottentota* 5–6·6, *C. sclateri* 5·6, *C. asiatica* 6, *C. villosa* 7·7); palatal width 7·4 mm. (*cf.* *C. hottentota* 7·5–8·8, *C. sclateri* 7·7, *C. asiatica* 8·5, *C. villosa* 10).

It will thus be seen that though the jaw is long it is relatively narrower than in any other species. Between the last premolars in *C. hottentota* there is a space of from 4 to 4·5 mm.; in *C. gunningi*, though the jaw is longer, the space is only 3·2.

*Chrysochloris gunningi* as regards its teeth comes nearer to *C. asiatica* than to *C. hottentota*, and yet as regards the skull it is almost certain to bear a greater resemblance to the latter. But until the skull is completely known, the nearest relationship cannot be determined and all that can at present be affirmed is that it is not a near ally of any of the previously known species. The Type specimen, collected by Mr. F. Vaughan Kirby, is in the Transvaal Museum.

#### CHRYSOCHLORIS HOTTENTOTA ALBIROSTRIS, WAGNER.

Many years ago Wagner described a mole from "Kaffraria" under the name of *Chrysochloris albirostris*, and gave what must be regarded as a very poor figure of the



animal. The description and figure are so unsatisfactory that no one has since been able to re-identify the mole with certainty. Dobson believes it to be a variety of *C. rutilans* (= *C. hottentota*), and Thomas has expressed the opinion that it may prove distinct. In my recent paper on the Golden Moles, I agreed in the main with both Dobson and Thomas that Wagner's mole would prove to be a distinct sub-species of *C. hottentota*.

Recently Dr. Gunning has obtained two specimens of *Chrysochloris* from Ngqeleni, West Pondoland, which I think we may conclude are Wagner's *C. albirostris*.

Specimen A has the back from the top of the head backwards of a very dark brown, nearly black. It is darker than the usual dark specimens of *C. hottentota*, but not so distinctly black as *C. h. corriæ*. The sides are dark reddish brown and the abdomen rather lighter. The under fur is slaty grey on the body sides and abdomen. The eye region has the white spot more distinctly marked than in other varieties of *C. hottentota* and the white hairs are so numerous in front of this spot that the whole of the cheeks and pre-frontal region are light grey. Immediately above the nasal pad the white and dark hairs are about equally mixed, but on the cheeks the white greatly predominate. The frontal region is dark grey. The measurements given of the specimens are H. and b 113 mm., hind foot 11. It was captured on 17th January, 1908, by Mr. H. H. Swinny. The sex is not given. The skull shows that the specimen is a very young adult.

The following are the chief measurements of the skull:— Greatest length 26, breadth 16, height 12·3, orbital region 8·3, dental series 10·2, molar series 5·6, palatal width 8.

Specimen B differs from the other in having the back of a lighter brown, in colour exactly agreeing with the typical dark specimens of *C. hottentota*. The fur of the face is slightly darker grey.

This specimen, of which the measurements are 115 and 11, is as seen by the skull scarcely full grown.

The skulls show that this form is only a sub-species of *C. hottentota*.

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## CATALOGUE

OF THE

SOUTH AFRICAN SNAKES IN THE COLLECTIONS OF  
THE TRANSVAAL MUSEUM, PRETORIA, THE  
ALBANY MUSEUM, GRAHAMSTOWN, AND THE  
STATE MUSEUM, BLOEMFONTEIN.

By LEWIS HENRY GOUGH, Ph.D., Assistant in the  
Transvaal Museum.

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After having identified the snakes in the Collections of the Albany Museum, Grahamstown, of the State Museum, Bloemfontein, and of the Transvaal Museum, Pretoria, in all about 1000 specimens, the records obtained appear to me interesting chiefly because of their bearing on the problem of Geographical Distribution.

Exact records of the localities from whence specimens of South African snakes have been obtained are rare, and as Mr. Boulenger remarks ("On a collection of Batrachians and Reptiles made in South Africa" by Mr. C. B. H. Grant, *etc.*, P.Z.S., 1905, II., p. 248), "Our knowledge of the exact distribution of these animals in South Africa is still very imperfect."

The list of records published here should go some way towards making their distribution better known, although still hardly sufficient to justify any attempt to map out the range of any of the species, even with the addition of the published records of other observers.

In synonymy and systematic arrangement I have strictly followed Mr. Boulenger's Catalogue of the British Museum.\*

Comparing Mr. Sclater's list of South African species of snakes (Ann. S.A. Mus. I., pp. 97-102) it will be seen that my list does not contain twenty-five [exclusive *Lycodon aulicus*

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\* Since receiving the revised proofs of this paper, "Herpetology of Japan," by L. Stejneger, has come to hand; the changes in Nomenclature, there proposed, have consequently not been able to be followed.

(Linné)] of the eighty species there mentioned, but that six additions to the fauna-list have been made, including four new species.

Although the new species discovered have been published elsewhere, their descriptions are here again given at length.

The species not observed by me were :—

- 1 Typhlops braminus (*Daud.*)
- 2 Typhlops verticalis (*Smith*)
- 3 Typhlops anchietæ (*Bocage*)
- 4 Typhlops mossambicus (*Peters*)
- 5 Typhlops mucroso (*Peters*)
- 6 Typhlops schinzi (*Boettger*)
- 7 Glauconia scutifrons (*Peters*)
- 8 Tropidonotus olivaceus (*Peters*)
- 9 Lamprophis fiski *Boulenger*
- 10 Lamprophis fuscus *Boulenger*
- 11 Boodon guttatus (*Smith*)
- 12 Boodon mentalis *Günther*  
[*Lycodon aulicus* (*Linné*)]
- 13 Chlorophis irregularis (*Leach*)
- 14 Prosymna frontalis (*Peters*)
- 15 Homalosoma variegatum *Peters*
- 16 Grayia lubrica *Sclater*
- 17 Pythonodipsas carinata *Günther*
- 18 Rhamphiophis multimaculatus (*Smith*)
- 19 Psammophis trigrammus *Günther*
- 20 Psammophis jallæ *Peracca*
- 21 Calamelaps concolor (*Smith*)
- 22 Macrelaps microlepidotus (*Günther*)
- 23 Elapechis decosteri (*Boulenger*)
- 24 Naia anchietæ *Bocage*
- 25 Bitis gabonica (*Dum. & Bibron*)

A key will be found after the list of specimens, which will be useful in determining South African species: being based entirely on external characteristics, it enables the classification of a single specimen, without destroying it for Museum purposes. It is admitted that the key is a very artificial one.

In this place I wish to express my sincere gratitude to the Authorities of the Albany Museum (especially Dr. Duerden) and of the State Museum for the kind manner and scientific spirit in which they placed their collections at my disposal.

**List of Species and Specimens in the Transvaal,  
the Albany, and the Bloemfontein Museums.**

TYPHLOPIDÆ.

TYPHLOPS BIBRONI (Smith).

*Blind Snake. Blindslang.*

*Ground Snake or Two-Headed Snake. Aard Slang.  
Tweekop Slang.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P*. 1, 2	Lydenburg	1896	Krantz
3	Modderfontein	1906	Haagner
4, 5	Shilowane, Zoutpans- berg District	1904-5	Junod
6, 7	No history (T)		
8	Krabbefontein, Zout- pansberg District		Breyer
9, 10	Pretoria		
11	Pretoria	1899	
12	Pretoria	1897	Du Preez
13	No history (T)		
14	Carolina District	1906	Horsbrugh
15	Mbabane	1906	Horsbrugh
16	Kingsdown, Bethal	1907	Simpson
A. 17	Woest Hill, Grahams- town	1892	Schönland
18, 19	No record		
B. 20, 21, 22	No record		

TYPHLOPS SCHLEGELI *Bianconi.*

*Schlegel's Blind Snake.*

P. 1	Selati	1896	Flygare
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TYPHLOPS DELALANDEI *Schlegel.*

*Delalande's Blind Snake.*

P. 1, 2	Frederikstad	1906	Cable
3	No record (T)		
4	Vereeniging	1907	Fry
A. 5	Dunbrody	1903	O'Neill
6, 7, 8	No records (C.C.)		

\* Note.—In the following list the letter P. denotes specimens belonging to the Pretoria, A. to the Grahamstown and B. to the Bloemfontein Museum.



TYPHLOPS PUNCTATUS (*Leach*).

A. 1 No record

## GLAUCONIIDÆ.

GLAUCONIA DISTANTI *Boulenger*.*Worm Snake. Wurm Slang.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Pretoria	1897	Mara
2	Pretoria	1897	
3	Pretoria	1897	Berk
4	Modderfontein	1907	Haagner
5	Pretoria	1907	Kretzma
A. 6	M'moouve, 42 miles north of Serowe	1903	Schönland

GLAUCONIA NIGRICANS (*Schlegel*).*Black Worm Snake. Zwartte Wurm Slang.*

P. 1, 2, 3	Shilowane, Zoutpans- berg		Junod
A. 4	Assegai River	1896	Street
5	Grahamstown Flats	1894	Pym
6	Port Alfred	1898	Pym
7 to 14	No records (C.C.)		

GLAUCONIA CONJUNCTA (*Jan.*)

P. 1	Bandolierkop, Zout- pansberg	1906	Gough
2	Letaba	1905	Swierstra
3 to 5	O.R.C.		
B. 6 to 11	No records (O.R.C.)		

## BOIDÆ.

PYTHON SEBÆ *Gmelin*.*Python. Renzen Slang.*

(Commonly miscalled Boa Constrictor by the Colonists.)

P. 1	No history		(Skin in alcohol)
2	Rustenburg	1907	Dyer (mounted)
3	Rustenburg	1907	Dyer (skin in alcohol)
4	Nelspruit	1907	Wilhelm (skull)
5	Nelspruit	1907	Wilhelm
6	Eureka, Barberton	1907	Brown
7	Louw's Creek	1907	Dreyer

## COLUBRIDÆ.

## COLUBRINÆ.

ABLABOPHIS RUFULUS (*Lichtenstein*).*Water Snake. Water Slang.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Vryheid, Natal	1906	Müller
2	Lydenburg	1896	Krantz
3	Modderfontein	1906	Haagner
4	Modderfontein	1906	Haagner
5	Pretoria	1906	
6, 7	Modderfontein	1906	Haagner
8, 9	Irene	1904	Taylor
10	Cape Colony	1897	Breyer
11	No history (T)		
12	Pretoria		Potgieter
13	Grahamstown	1897	Albany Museum
14	Pretoria	1897	Gunning
15 to 17	Pretoria, no history		
18	Driefontein, near Johannesburg	1907	Parry
19	Boekenhoutkloof, Magaliesberg	1907	Zeiler
A. 20	Grahamstown	1906	Anderson
21	Grahamstown		
22, 23	Western Province		Swinney
24, 25	Pretoria	1907	Transvaal Museum
26	Grahamstown	1883	Abbot
27	Brakkloof, Grahamstown	1900	White
28	Grahamstown	1892	Hopley
29 to 35	No records, probably Grahamstown, C.C.		
B. 36 to 37	No record (O.R.C.)		

LAMPROPHIS AURORA (*Linneé*).*Night Snake. Nacht Slang.*

P. 1, 2, 3	Lydenburg	1896	Krantz
4, 5	Krabbefontein, Zoutpansberg		Breyer
6, 7, 8	Modderfontein	1905	Haagner
9, 10, 11	Grahamstown	1897	Albany Museum
12, 13	Modderfontein	1907	Haagner
A. 14	Grahamstown	1901	Kent
15, 16	Brakkloof, Grahamstown		White
17	Grahamstown	1906	

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
18, 19	Grahamstown	1906	Cherry
20	Capetown		Brady
21	Brakkloof, Grahams- town	1900	White
22	No record (Grahams- town).		
B. 23 to 27	No record (O.R.C.)		

LAMPROPHIS INORNATUS *Duméril & Bibron.*

A. 1	Grahamstown	1904	Jupp
2	Grahamstown	1906	Perkins

## BOODON INFERNALIS GÜNTHER.

*Dark House Snake.*

P. 1	Irene		Taylor
2	No history		
A. 3	Grahamstown	1894	Jupp
4	Grahamstown	1903	Jupp
5	No record (C.C.)		

BOODON LINEATUS *Duméril & Bibron.**Brown House Snake.*

P. 1	Vryheid, Natal	1906	Müller
2	Barberton	1906	De Beer
3	Lydenburg	1896	Krantz
4	Krabbefontein, Zout- pansberg		Breyer
5	Modderfontein	1906	Haagner
6, 7, 8	Irene		Taylor
9	Cape Colony	1897	Breyer
10	No history		
11, 12	Pretoria	1906	
13	Selati	1897	Flygare
14	Grahamstown	1897	Albany Museum
15	Pretoria	1907	Van Bergen
16	Zeerust, Marico	1907	Fernleigh
17	Krugersdorp	1907	Holder
A. 18, 19	No records (C.C.)		
20	Grahamstown	1906	Native
21	Grahamstown	1906	Greathead
22	No record (C.C.)		
23	Grahamstown	1906	O'Connor
B. 24 to 40	No record (O.R.C.)		

LYCOPHIDIUM CAPENSE (*Smith*).*Spotted Snake.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Lydenburg	1896	Kranz
2, 3	No history		
4	Elim Hospital, Zoutpansberg	1906	Borle
5	Krabbefontein		Breyer
6	Pretoria	1907	Gunning
7	Pretoria	1907	Smith
A. 8	Grahamstown	1903	
9	Palapye Rd., Kalahari		Blackbeard
10	Grahamstown	1906	Wood
11	Grahamstown	1906	Shaw
12	Grahamstown	1906	Sterley
13, 14	Grahamstown		
15	Brakkloof, Grahamstown	1896	White
16	Grahamstown		

SIMOCEPHALUS CAPENSIS (*Smith*).*Three-cornered Snake. Vijlslang.*

P. 1	No record
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SIMOCEPHALUS NYASSÆ (*Günther*).*Northern Three-cornered Snake. Noordelijke Vijlslang.*

P. 1	No record
2	Leydsdorp 1907 Copland

PSEUDASPIS CANA (*Linné*).*Mole Snake. Molslang.*

P. 1, 2, 3	Vryheid, Natal	1906	Müller
4	Shilowane, Zoutpansberg	1904-5	Junod
5	Irene	1905	Taylor
6	Selati	1896	Flygare
7	No history		
8	Fountaingrove, Pretoria	1896	Malherbe
P. 9	Olivenhouts Poort, near Johannesburg	1907	Forrest
10, 11	Modderfontein	1907	Haagner
12	Vryheid, Natal	1906	Müller
13	Rustfontein, Bethal	1907	Macpherson
14	Pinedene, Pretoria District	1907	Carlisle
15	Six Mile Spruit, Pretoria	1907	Smith
A. 16	Grahamstown		Drennan



	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
17, 18	Brakkloof, Grahams-town	1906	White
19	Port Elizabeth	1894	Reeve
20	Nash Vale Barroe St.	1893	
21 to 22	M'moouve, 42 miles north of Serowe	1903	Blackbeard
23 to 27	No records (C.C.)		
B. 28	No record (O.R.C.)		

CHLOROPHIS HOPLOGASTER (*Günther*).*Green Snake. Groen Slang.*

P. 1	Vryheid, Natal	1906	Müller
2, 3	Lydenburg	1896	Krantz
4	Cape Colony	1897	Breyer
5	Pretoria	1896	Gunning
6, 7	No history		
8	Pretoria	1898	Barrett
9	Pretoria ?	1897	Hollenbach
10	Pretoria	1896	
11, 12	No history		

CHLOROPHIS NATALENSIS (*Smith*).*Eastern Green Snake. Natalsche Groene Slang.*

P. 1	Vryheid, Natal	1906	Müller
2, 3, 4	Selati, Zoutpansberg District	1897	Flygare
5	Pretoria	1896	Breyer
6	Henops River, Pretoria	1907	
A. 7	No record (C.C.)		

PHILOTHAMNUS SEMIVARIEGATUS (*Smith*).*Bush Snake. Bosch Slang.*

P. 1	Vryheid, Natal	1906	Müller
2	Pretoria District	1897	Bonker
3	No history		
4	Shilowane, Zoutpansberg District	1904-5	Junod
5	Malalane	1907	Bolton
A. 6	Serowe	1906	Blackbeard
7	Grahamstown	1903	
8	No record (C.C.)		

PROSYMNA SUNDEVALLI (*Smith*).*"Coppery Snake."*

P. 1, 2	Krabbefontein, Zoutpansberg District		Breyer
A. 3	Brakkloof, Grahams-town	1896	White
B. 4, 5	No record (O.R.C.)		

## HOMALOSOMA LUTRIX (Linné).

*Smooth-bellied Snake. Gladbuik Slang.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1, 2	Grahamstown	1897	Albany Museum
3, 4	Cape Colony	1897	Breyer
5	No history	(T)	
6	Lydenburg	1896	Kranz
7	Irene	1905	Taylor
8, 9	Tokai, Cape Colony	1902	Taylor
10, 11	Cape Colony	1897	Breyer
12	Pretoria	1897	
A. 13	Albany		
14	Grahamstown		
15 to 25	No record (C.C.)		
B. 26 to 28	No record (O.R.C.)		

## HOMALOSOMA SHIRANUM Boulenger.

P. 1	Tokai, Cape Colony	1897	Taylor
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This specimen was in the same bottle as Nos. 8 and 9 of *H. lutrix* and was probably caught at the same place, but it differs so much from *H. lutrix* that I have great hesitation in ascribing it to that species: at the same time it seems most to resemble *H. Shiranum* Boulenger, although differing in some minor respects.

The rostral is broader than deep, just visible from above: suture between the internasals longer than that between the præfrontals. Frontal once and a half as long as broad, longer than its distance to the end of the snout, shorter than the parietals, twice as broad as the supraocular.

Parietals separated by two small scales. Nostril in the anterior half of the nasal, no loreal, nasal in contact with the præocular: two postoculars.

Six upper labials, third and fourth entering the eye. Temporals, right side 1 and 3, left side 1 and 2. Two pairs of chin-shields, the anterior in contact with three labials. Scales in 15 rows. Ventrals 131, anal entire, subcaudals 31. Uniform olive-brown above, belly yellowish white, outer ends of ventrals and outer row of scales slaty grey, edged with brown.

It will be seen that it differs from *H. lutrix* in the nasal being in contact with the præocular, and in the proportionate lengths of the suture between the internasals and the præfrontals.

This proportion, however, does not reach that of *H. shiranum* Boulenger (3 to 1) being at the most 2 to 1, the right internasal (the right præfrontal and the frontal being missing in the specimen, make accurate measurements rather difficult).

It differs from *H. shiranum* in having two postoculars instead of only one, a trifling difference considering the great tendency of the postoculars of most species of snakes to vary in numbers.

In coloration it agrees with *H. shiranum* fairly closely. Had the specimen been secured from the North of the Transvaal, there would have been little need of hesitation in recording it as *Homalosoma shiranum* Boulenger, it is only necessary because it appears to have been caught in Cape Colony.

#### RACHIODONTINÆ.

##### DASYPELTIS SCABRA (*Linneé*).

*Egg-Eating Snake. Eier Vreter.*

(Scaled Snake in South Africa.)

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1, 2, 3, 4	No history		
5	Modderfontein	1906	Haagner
6, 7, 8	Shilowane, Zoutpans- berg District	1904-5	Junod
9, 10	Krabbefontein, Zout- pansberg District		Breyer
11, 12	Modderfontein	1906	Haagner
13, 14	Irene	1905	Taylor
15	Cape Flats	1902	Taylor
16	Selati, Zoutpansberg District	1897	Flygare
17	Louw's Creek	1907	Gough
18	Vryheid, Natal	1906	Müller (var palmarum)
19, 20, 21	No history		
A. 22	M'moouve 42 miles north of Serowe	1903	Schönland
23	Serowe	1906	Blackbeard
24, 25	Grahamstown	1896	Henshman
26	Grahamstown	1905	Jupp
27, 28, 29	No record (C.C.)		
B. 30, 31, 32	No record (O.R.C.)		

#### DIPSADOMORPHINÆ.

##### TARBOPHIS SEMIANNULATUS (*Smith*).

*Tiger Snake. Tijger Slang.*

P. 1	Pretoria	1906	Gough
2	Barberton	1906	De Beer
3	Barberton	1897	
4, 5	Shilowane, Zoutpans- berg District	1904-5	Junod
6	Pretoria	1897	Barrett

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
7	Krabbefontein, Zoutpansberg District		Breyer
8	Pretoria	1896	
9	Barberton	1907	De Beer
10	Pretoria	1907	
11	Boekenhoutkloof, Magaliesberg	1907	Zeiler
12	Onderstepoort	1907	Herrington
13	Leydsdorp	1907	Copland
14	Pretoria	1907	
15, 16	Serowe	1906	Blackbeard
17	Barberton	1898	Lawrence
18	No record (? T)		

LEPTODIRA HOTAMBŒIA (*Laurenti*).*Red-lipped Snake or Herald Snake. Roodlip Slang.*

P. 1	Irene	1906	Mansvelt
2	Wonderboom, Pretoria	1906	Adendorff
3	Lydenburg	1896	Kranz
4	Modderfontein	1906	Haagner
5	Lydenburg	1896	Kranz
6	Krabbefontein, Zoutpansberg District		Breyer
7, 8	Modderfontein	1906	Haagner
9	Irene	1905	Taylor
10, 11	Cape Flats	1902	Taylor
12	Cape Colony	1897	Breyer
13	Pretoria	1900	
14, 15, 16	Krabbefontein, Zoutpansberg District		Breyer
17	Selati, Zoutpansberg	1896	Flygare
18	No history		
19	Grahamstown	1897	Albany Museum
20, 21	Selati, Zoutpansberg District	1896	Flygare
22	Pretoria	1897	Amman
23	Middelburg (T.)	1907	Pershouse
24, 25	Pretoria	1907	
26	Pretoria	1907	Swierstra
A. 27	Grahamstown (?)	1887	Fisher
28	Grahamstown	1906	
29	Grahamstown	1906	Norton
30	Grahamstown		
31 to 33	Grahamstown		Morton
34	Grahamstown	1902	Smith
35	Grahamstown	1906	Wellings
36 to 38	No records (C.C.)		
B. 39 to 46	No records (O.R.C.)		



AMPLORHINUS MULTIMACULATUS (*Smith*).

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Belfast (T)	1906	Mansvelt
2	No history		
3, 4, 5	Irene	1905	Taylor
B. 6	No record (O.R.C.)		

TRIMERORHINUS RHOMBEATUS (*Linné*).

*Schaapstekers*. Known to English speaking Colonists only by its Dutch name.

P. 1	Vryheid, Natal	1906	Müller
2	Lydenburg	1896	Krantz
3, 4	Shilowane, Zoutpans- berg District	1904-5	Junod
5, 6	Modderfontein	1906	Haagner
7	No history (T)		
8, 9, 10	Irene	1905	Taylor
11	Tokai, Cape Colony	1902	Taylor
12	Pretoria		
13, 14, 15	Cape Colony	1897	Breyer
16	Volksrust		
17, 18	Grahamstown	1897	Albany Museum
19, 20, 21	Germiston	1907	Wayland
22	Swartkoppies, Pretoria	1907	Smith
23	Modderfontein	1907	Haagner
24	Irene	1907	Gough
25	Krabbefontein		Breyer
A. 26	Grahamstown		
27	Grahamstown		Butler
28	Grahamstown (?)	1888	Brady
29	Grahamstown	1905	Ogilvie
30, 31	Capetown		Brady
32	Brakkloof, Grahams- town	1899	White
33	Brakkloof, Grahams- town	1900	White
34 to 41	No records (C.C.)		
B. 42 to 53	No records (O.R.C.)		

TRIMERORHINUS TRITÆNIATUS (*Günther*).

*Striped Schaapstekers*. *Gestreepte Schaapstekers*.

P. 1, 2	Lydenburg District	1896	Kranz
3	Selati, Zoutpansberg	1897	Flygare
4	No history		
5	Swartkoppies, Pretoria	1907	
A. 6, 7, 8	Bechuanaland	1896	Harri

PSAMMOPHIS SIBILANS (*Linné*).*Hissing Sand Snake. Zand slang.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Kaapmuiden	1906	Bolton
2	Louw's Creek	1907	Dreyer
3	Shilowane, Zoutpans- berg District	1904-5	Junod
4	Pretoria	1900	
5	Selati, Zoutpansberg District	1897	Flygare
A. 6	M'moouve, 42 miles north of Serowe	1903	Schönland
7	Serowe	1906	Blackbeard
8	No record (T ?)		
B. 9, 10	No record (O.R.C. ?)		

PSAMMOPHIS FURCATUS (*Peters*).*Forked Sand Snake. Geforkte Zandslang.*

P. 1	Pretoria	1896	Breyer
2	Pretoria	1906	
3	Pretoria	1907	
4	Daspoort, Pretoria	1907	Theiler
B. 5 to 8	No records (O.R.C.)		

PSAMMOPHIS LEIGHTONI *Boulenger*.*Southern Sand Snake. Zuidelijke Zandslang.*

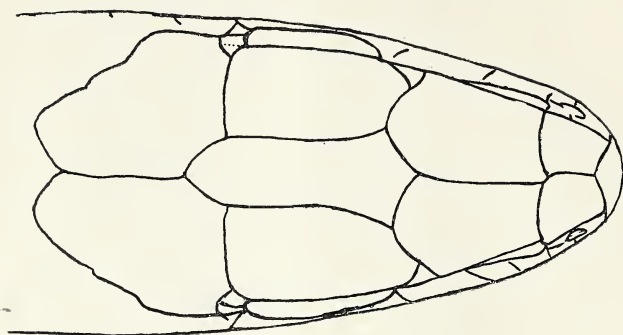
A. 1	Capetown	Brady
2	No records (C.C.)	

PSAMMOPHIS BREVIROSTRIS *Peters*.*Shortsnouted Sand Snake. Kortsnoet Zandslang.*

P. 1	Pretoria	1906	
2	Wonderboom		Adendorff
3	Pretoria		Barrett

PSAMMOPHIS CRUCIFER *Boie*.*Grass Snake, Crossed Snake. Gras Slang.*

P. 1, 2	Vryheid, Natal	1902	Müller
3	Tokai, Capetown	1905	Taylor
4, 5	Irene	1905	Taylor
6	Cape Colony	1897	Breyer
7	Lydenburg	1907	Jansen
8	Barberton	1907	
A. 9	Brakkloof, Grahams- town	1906	White
10	Grahamstown		Butler
11, 12	Capetown		Brady
13	Grahamstown	1903	Barnes
14 to 25	No records (C.C.)		
B. 26	No record (O.R.C.)		

*PSAMMOPHIS THOMASI Gough.*

Snout once and two-thirds as long as the eye. Rostral broader than deep. Internasals less than half as long as the prefrontals : frontal more than twice as long as broad (9.6 mm. long, 4 mm. broad in front, but only 2.6 in the middle) ; frontal longer than its distance to the end of the snout, and narrower in the middle than the supraocular (which measures 3.6 mm.).

Parietals shorter than the frontal (measuring 8.7 mm.). Nostril between three nasals, a large anterior and two small superimposed posterior. Loreal twice and a half as long as broad, separated from the internasals. One large præocular, widely separated from the frontal. Suture between præfrontal and supraocular 1.5 mm. long. The præfrontal is in contact with the loreal supraocular, and upper labials 3 and 4. Two postoculars.

Temporals, 1+1 or 2+1 (in the type right side 1+1, left side 2+1). A large shield behind and outside each of the parietals. Eight upper labials, fourth and fifth entering the eye, sixth largest. Two pairs of equal chin-shields. A long suture between the first pair of lower labials behind the chin-shields (2.5 mm.), four lower labials in contact with the anterior chinshields. Scales oblique, the outer rows much broader than the inner ones, in 17 rows.

Scales on the upper surface of the tail larger than the corresponding ones on the body. Ventrals 167. Anal divided. Subcaudals in 92 pairs.

Length of type specimen 117 cm., of which 33.5 belong to the tail.

Olive brown above, becoming gradually much lighter on the sides and below, where the brown tone becomes more bluish.

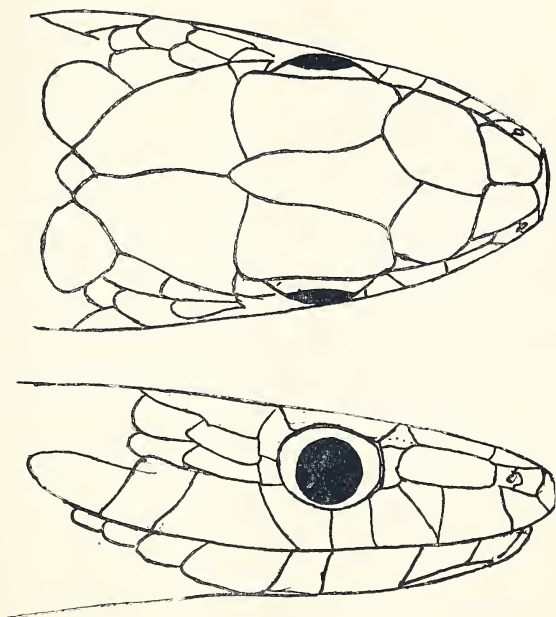
The middle of the ventrals yellowish, especially in the distal two-thirds of the body. Sides of the scales with black

edges, on the outmost row the black edging is reduced to small spots on the ventral side, or even quite absent. The under side of the body finely speckled with black.

Head brown with a reddish tinge, pink behind the angle of the jaws. Parietals and postparietals with black spots. Upper lip yellow, the upper half of each scale being brown like the rest of the head, the two colours separated by a broken dark line, the lower half with large, dark-edged brown marks. A faint yellow dark-edged line on the canthus rostralis. Under-lip and chin, and the first few ventrals yellowish with more or less rounded grey markings.

P. 1                      Salisbury, Rhodesia                      1907   Thomas (type)

*PSAMMOPHIS TRANSVAALIENSIS. Gough.*



Snout once and two-thirds as long as the eye. Rostral much broader than deep, visible from above. Nostril between two shields: internasals two-thirds as long as the prefrontals. Frontal more than twice as long as broad, in the middle two-thirds the width of the supraocular, much longer than its distance to the end of the snout, somewhat longer than the parietals: loreal about twice as long as deep; two preoculars, the upper widely separated from the frontal; two postoculars: temporals 2+2: eight upper labials, third, fourth and fifth entering the eye: four lower labials in contact with the anterior chin-shields, which are shorter, but broader than the postocular.



Scales in 17 rows. Ventrals 171. Anal divided, preceded by a single half scale. Subcaudals ? The end of the tail had been lost during life, and a terminal conical scale regenerated, only 9 pairs of subcaudals remaining.

The seven middle rows of scales dark brown, tipped or edged with black. The top third of the row of scales fifth from middle of back, black : lower two-thirds of fifth row and upper two-thirds of sixth row cream coloured ; outer third of this row black. The seventh and eighth rows dark brown, almost black at the tips. Upper half of outer row black, lower cream.

A black line along each side of the ventrals, the space between the black lines yellow. Lips and chin cream with black dots and markings, a black line runs along the upper edge of the labials across the rostral. Upper surface of the head light brown, with darker black edged markings, a lighter transverse band on the nape. The yellow lateral stripes originate at a short distance from the head, the portion of the neck anterior to them with indistinct cross bars.

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Louw's Creek	1907	Dreyer (type).

THELTORNIS KIRTLANDI. (*Hallowell*).

*Bird Snake. Vogelkreter.*

P. 1	Dwars River, Zoutpansberg District	1906	Gough
2	Bandolierkop, Zoutpansberg District	1906	Setterfield
3	Zoutpansberg	1907	Pienaar
4, 5, 6	No history		
7	Louw's Creek	1907	Gough
A. 8	M'moouve, 42 miles north of Serowe	1903	Schönland

DISPHOLIDUS TYPUS (*Smith*).

*Tree Snake. Boom Slang.*

(Usually called Green Mamba in the Transvaal, where it is considered by most people to be a poisonous snake.)

P. 1	Pretoria	1897	Deary
2	Pienars River	1900	Jutrenka
3, 4	Vryheid, Natal	1906	
5, 6	Lydenburg District	1896	Krantz
7	Shilowane, Zoutpansberg District	1904-5	Junod
8	Cape Flats	1903	Taylor
9	Selati, Zoutpansberg District	1896	Flygare

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
10	Grahamstown	1897	Albany Museum
11	Wolhutterskop	1907	Maynard
12	Salisbury, Rhodesia	1907	Thomas
A. 13	Brakkloof, Grahams- town	1906	White
14	Grahamstown	1906	O'Connor
15	Brakkloof, Grahams- town	1891	White
16	No records (C.C.)		

APARALLACTUS CAPENSIS (*Smith*).*Black-headed Snake. Zwartkop Slang.*

P. 1	Selati, Zoutpansberg District	1896	Flygare
2	Lydenburg District	1896	Krantz
3, 4	Modderfontein	1906	Haagner
5	Shilowane, Zoutpans- berg District	1904-5	Junod
6, 7	Krabbefontein, Zout- pansberg District		Breyer
8 to 12	Irene	1905	Taylor
13	No history		
14	Modderfontein	1907	Haagner
15, 16	Kraalkop, Bank	1907	Cable
17	Salisbury, Rhodesia	1907	Thomas
B. 18	No record (O.R.C.)		

## HYDROPHIINÆ.

HYDRUS PLATURUS (*Linné*).*Sea Snake.*

P. 1	Simons Bay, Cape Colony	1903	Taylor
2	South Seas	1897	Museum Gode- froy
A. 3	Olifants Hoek Coast		
4	Caxton Farm, Bathurst District	1903	Webb

## ELAPINÆ.

ELAPECHIS GUENTHERI *Bocage*.*Northern Garter Snake.*

P. 1, 2	Lydenburg District	1896	Krantz
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Specimen 1 is entirely black above, with only a few white lines formed by spots, on the posterior part of the body; Specimen 2 is semiannulate black and white.

## ELAPECHIS SUNDEVALLI (Smith).

*Sundevall's Garter Snake.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	North Natal	1900	Tressling
2	No history		
3	O.R.C.		
4	De Deur, Evaton	1907	Koelkenbek
B. 5 to 8	No history, O.R.C.,		Young

As this snake has long only been known in very few specimens, the following data concerning the two largest specimens in the Pretoria Museum will be of interest.

The proportion of the portion of the rostral visible from above to the distance of the rostral from the frontal, seems to be an inconsistent character, in No. 1 it is only equal to three-fourths the distance from the frontal in No. 2 it actually exceeds the distance (No. 1, 2·3 : 3 mm., No. 2, 2·4 : 2 mm., suture between the internasals No. 1, 1 mm., No. 2, 0·6 mm.; suture between the præfrontals No. 1, 2·6 mm., No. 2, 1·6. Length of frontal No. 1, 5·3 mm., No. 2, 5·4 mm.; breadth of frontal No. 1, 4·2 mm., No. 2, 4·1 mm. In No. 1 the length of the frontal is a trifle shorter, in No. 2 it is a little longer than its distance from the end of the snout. Suture between the parietals No. 1, 5 mm., No. 2, 3·8. Posterior nasal of both in contact with the single præocular, two postoculars; temporals No. 1, right side 1 and 2, left side 1 and 1 and 2, No. 2 both sides 1 and 2. Seven upper labials, third and fourth entering the eye, sixth largest.

First pair of lower labials meeting behind the symphysial, two pairs of chinshields, anterior slightly larger than the posterior and in contact with three lower labials. Scales in 13 rows.

Ventrals No. 1, 172, No. 2, 165, anal entire, subcaudals No. 1, 23, No. 2, 21. No. 1 has 28 chocolate-brown half rings above, the anterior of which extend longitudinally over 5 or 6 scales, the posterior over 4 or 5 scales, between those dark half rings are lighter brown ones, edged in front and behind by a white or yellowish line one scale wide. The dark colour of the most anterior ring is produced  $\Lambda$  shaped on the nape and extends to the front of the frontal. Upper lip and lower parts light. No. 2 has faded very badly, but traces of the chevron shaped mark on the nape can be made out, the other markings have been nearly entirely obliterated.

No. 1 was caught in North Natal by Mr. Tressling when on commando in his tent under his bed, it was carried about by him during part of the campaign in spirits, until he found an opportunity to send it to Pretoria,

NAIA HAIE (*Linné*).*Egyptian Cobra or Banded Cobra. Egyptische Cobra.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Pretoria	1896	Pistorius
2	Pretoria	1906	
3	Warmbaths	1907	Bibbing
4	Hunyani, Rhodesia	1907	Thomas
5, 6, 7	No history		
8	Elandsdraal, Pienars- river	1907	Fuchs
9	Wonderboom, Pretoria	1907	Theiler
10	Daspoort, Pretoria	1907	Smith
B. 11	No record (O.R.C.)		

Specimens 3 and 4 both belong to an interesting colour variety, which is evidently very widely distributed, as it also occurs near Pretoria.

They are both full grown specimens, measuring 178 cm. and 183 cm. respectively. The head, body and tail of both specimens are black, above and below, interrupted, however, in No. 3 by 11, and in No. 4 by 10 broad yellow or brown annuli, embracing up to 10 subsequent rings of scales. The annuli are narrowest on neck and tail. As they do not differ in any way in their lepidosis from normal specimens of *Naia haie*, they must be ascribed to that species in spite of their large size and abnormal markings. (Peter's description of *Naia haie* var *annulifera* was not accessible, so I have not been able to compare it with that variety.)

According to Mr. Thomas, these full-grown banded Cobras feed on smaller snakes.

NAIA FLAVA (*Merrem*).*Yellow or Cape Cobra. Geelslang, Koper Kapel.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1, 2	Tokai, Cape Colony	1902	Taylor
3	No history		
A. 4	Graaf Reinet		Hobson
B. 5 to 8	No records (O.R.C.)		

NAIA NIGRICOLLIS (*Reinhardt*).*Black-necked Cobra, often miscalled Ringhals.*

P. 1	Visser's Hoek, Pretoria		
	District	1906	Viljoen
2	Shilowane, Zoutpans- berg District	1904-5	Junod
3, 4, 5	No history		
A. 6	Palapye Road, Kala- hari Desert		Blackbeard



SEPEDON HÆMACHATES (*Lacépède*).*Ringhals.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1, 2	Vryheid, Natal	1906	Müller
3	Grahamstown	1897	Albany Museum
4, 5	Irene	1905	Taylor
6	Fountain Grove, Pretoria	1898	Jutrzenka
7	Ventersdorp	1906	Cable
8	Germiston	1907	Wayland
9, 10, 11	Vryheid, Natal	1906	Müller
12	Klip River	1907	Allison
13	Val Station, Standerton	1907	Hutton
A. 14, 15	Grahamstown	1906	Cherry
16	Grahamstown	1906	Wellings
17	Grahamstown	1888	
18, 19	No records (C.C.)		
B. 20 to 27	No records (O.R.C.)		

ASPIDELAPS SCUTATUS (*Smith*).*Shield Snake.*

P. 1	Selati, Zoutpansberg District	1896	Flygare
2, 3, 4	No history		
5	Palla Road	1907	Hodson

ASPIDELAPS LUBRICUS (*Laurenti*).*Slender Shield Snake.*

P. 1	O.R.C.
B. 2, 3	No records (O.R.C.)

HOMORELAPS LACTEUS (*Linneé*).*Garter Snake. Kousband Slang.*

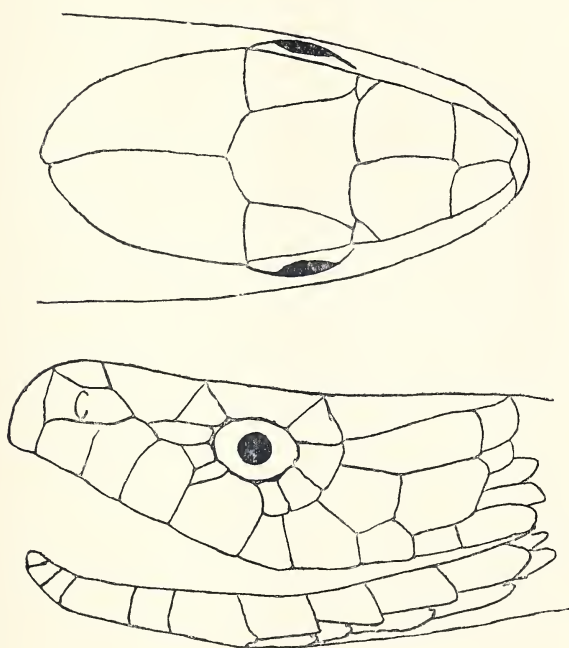
P. 1	Krabbefontein, Zoutpansberg District		Breyer
2, 3	Grahamstown	1897	Albany Museum
A. 4	Grahamstown		Cogan
5, 6	Grahamstown		
7	Middleton (C.C.)	1906	Whitehead
8	Riebeck East	1902	Smith
9	Tootabi	1904	Sangster
10	Brakkloof, Grahamstown	1906	White
11	Brakkloof, Grahamstown	1907	White
12, 13, 14	Grahamstown		
15 to 56	Grahamstown (?) No records		
B. 57 to 60	No records (O.R.C.)		

HOMORELAPS DORSALIS *Smith.**Striped Garter Snake.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Pretoria	1897	
2	Vryheid	1907	
3	No record		
B. 5	Bloemfontein		Albrecht
6 to 9	No record (O.R.C.)		

DENDRASPIS ANGUSTICEPS (*Smith*).*Tree Cobra. Mamba.*

P. 1, 2	No history		
3	Nelspruit	1907	Wilhelm
4	Louw's Creek	1907	Dreyer

DENDRASPIS MAMBA *Gough.*

Rostral once and one-third broader than deep, præfrontals twice as long as the internasals, frontal as long as broad, shorter than its distance from the end of the snout, shorter than the parietals, forming a short suture with the upper præocular: three præoculars, the upper broadest, the middle one nearly three times as long as broad, simulating a loreal, just separated from the posterior nasal, the lowest smallest, with a small subocular below it wedged in between the fourth and fifth upper labials: three postoculars, upper largest, a subocular, below and in front of the lowest postocular, in contact with the fourth, fifth and sixth upper

labials; a large upper temporal, followed by two or three enlarged scales bordering the parietal, two large lower temporals, together as long as the upper temporal, followed by two superimposed enlarged scales; the lower margin of the anterior lower temporal is wedged in between the sixth and seventh upper labials; nine upper labials, fourth entering the eye, second twice as deep as the first, just in contact with the prefrontal; three lower labials in contact with the anterior chin-shields which are almost twice as long as the posterior, the anterior chin-shields are separated from each other by very minute scales, the posterior ones by small scales. Scales in 25 rows, 29 around the neck, ventrals 269, anal divided, subcaudals 116 pairs. Dark olive green above, blueish green below, skin between the scales very dark purple.

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	White River Settlement	1907	Cooke (type.)

## VIPERIDÆ.

CAUSUS RHOMBEATUS (*Lichtenstein*).*Night Adder. Nacht Adder.*

P. 1	Pretoria	1906	Aspinall
2	Vryheid, Natal	1906	Müller
3, 4	Haenertsburg, Zoutpansberg District	1906	Gough
5	Pretoria	1897	Boh
6	Pretoria	1896	Breyer
7	Silverton	1905	Visser
8	Grahamstown	1897	Albany Museum
9, 10	Lydenburg District	1896	Krantz
11, 12	Fountain Grove, Pretoria	1901	Jutrzenska
13	Pretoria	1906	
14 to 17	Irene	1905	Taylor
18, 19	Cape Colony	1897	Breyer
20	Pretoria	1900	
21	Pretoria	1897	Boh
22	Pretoria	1897	
23 to 26	No history		
27	Pretoria	1907	
28	Boekenhoutkloof, Magaliesberg	1907	Zeiler
29	Frederikstad	1907	Cable
30	Salisbury, Rhodesia	1907	Thomas
A. 31	Grahamstown	1906	
32	Grahamstown	1907	Native
33, 34	Tootabi	1905	Sangster
35 to 37	No records (C.C.)		

CAUSUS DEFILIPPI *Jan.**Snouted Night Adder.*

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
P. 1	Louw's Creek, Barber-	1906	Dryer
	ton District		
2	Shilowane, Zoutpans-	1904-5	Junod
	berg District		
3	Selati, Zoutpansberg	1896	Flygare
	District		
4	Elim Hospital, Zout-	1906	Borle
	pansberg District		

BITIS ARIETANS (*Merrem*).*Puff Adder. Pof Adder.*

P. 1 to 6	Vryheid, Natal	1906	Müller
7	Shilowane, Zoutpans-	1904-5	Junod
	berg District		
8	Elim Hospital, Zout-	1906	Borle
	pansberg District		
9	Tokai, Cape Colony	1902	Taylor
10	Cape Flats	1903	Taylor
11 to 54	Forty-four embryos	1906	Bolton
	taken from a single		
	female; Pietersburg,		
	Zoutpansberg Dist.		
55	Vryheid	1906	Müller
56	Salisbury, Rhodesia	1907	Thomas
A. 57	Grahamstown	1906	Duerden
58	Serowe	1906	Blackbeard
59	No record (C.C.)		
B. 60 to 63	No records (O.R.C.)		

BITIS ATROPOS (*Linné*).*Berg Adder.*

P. 1	Grahamstown	1897	Albany Museum
2	Addo, Albany		Potgieter
3, 4	No records (C.C.)		

BITIS CORNUTA (*Daudin*).*Hornsman.*

P. 1, 2	Cape Flats	1903	Taylor
A. 3	Capetown		Brady

BITIS CAUDALIS (*Smith*).*Horned Puff Adder.*

P. 1, 2	Bandolierkop, Zout-	1906	Gough
	pansberg		
A. 3, 4	Serowe	1904	Blackbeard
5	M'moouve, 42 miles	1903	Schönland
	north of Serowe		



	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
6	Serowe		Blackbeard
7			Hobson
8 to 11	No records (C.C. ?)		
	BITIS INORNATA ( <i>Smith</i> ). <i>Cape Puff Adder.</i>		
A. 1	Brakkloof, Grahams- town	1892	White
	BITIS PERINGUEYI <i>Boulenger.</i> <i>Peringuey's Puff Adder.</i>		
A. 1	No records (C.C.)		
	ATRACTASPIS BIBRONI <i>Smith.</i> <i>Oviparous Adder.</i>		
P.	Shilowane, Zoutpans- berg District	1904-5	Junod
	ATRACTASPIS DUERDENI <i>Gough.</i>		

Snout prominent, subcuneiform, rostral with a rounded horizontal edge; the portion visible from above a little longer than its distance from the frontal. Internasals and præfrontals much broader than long. Suture between the internasals shorter than that between the præfrontals.

Frontal broader than long, shield shaped, longer than its distance from the end to the snout. Longer than the parietals an azygous enlarged shield behind the parietals.

One præ- and one post-ocular: a large temporal wedged in between the fourth and fifth upper labials; five upper labials, first very small, third and fourth entering the eye, fourth largest.

Posterior nasal much larger than the anterior.

First lower labial in contact with its fellow behind the symphysal; three lower labials in contact with the chin-shields, third very large, corresponding with the second, third and fourth labials.

Two pairs of chin-shields, first pair very large and broad, second pair two-thirds the length of the first and much narrower, wedged in between the first chin-shield and the labial, their posterior tips separated by three scales, of which the middle one is slightly enlarged.

Scales in 21 rows. Ventrals 199. Anal entire. Sub-caudals 22; all except the first entire.

Cream coloured above and below.

	<i>District.</i>	<i>Date.</i>	<i>Donor.</i>
A. 1	Serowe	1904	Blackbeard (type)

## Key to the South African Genera and Species of Snakes.

- |     |   |    |
|-----|---|----|
| 1.  | Eyes rudimentary ... ..   | 2  |
|     | Eyes well developed ... ..  | 15 |
| 2.  | At least eighteen scales round the body.  |    |
|     | Typhlops ... ..   | 3  |
|     | Only fourteen scales round the body.  |    |
|     | Glaucônia ... ..  | 12 |
| 3.  | Nostril between two nasals ... ..   | 4  |
|     | Nostril semi-divided ... ..   | 5  |
| 4.  | Snout rounded, nostrils lateral (20 scales round the body, diameter of the body contained 35-55 times in total length).<br>Typhlops braminus ( <i>Daud.</i> )   |    |
|     | Snout with obtusely angular horizontal edge, nostrils inferior: (24 scales round the body, diameter of body contained 30 times in total length).<br>Typhlops mossambicus ( <i>Peters</i> ).   |    |
| 5.  | Snout with angular horizontal edge ... ..   | 6  |
|     | Snout rounded, no angular horizontal edge: (22 scales round the body, diameter of body contained 42 times to 45 times in total length).<br>Typhlops verticalis ( <i>Smith</i> ).  |    |
| 6.  | The cleft in the nasal proceeds from the first labial ... ..  | 7  |
|     | The cleft in the nasal proceeds from the lower lateral border of the rostral: (30-32 scales round the body, diameter of the body contained 24 times in the total length).<br>Typhlops anchietæ ( <i>Bocage</i> ).                       |    |
| 7.  | The rostral extends to the level of the eyes ... ..   | 8  |
|     | The rostral does not extend to the level of the eyes; (Snout strongly hooked with sharp cutting edge, 26 scales around the body, diameter of the body contained 45 times in the total length).<br>Typhlops schinzi ( <i>Boettger</i> ). |    |
| 8.  | Edge of snout sharply angular ... ..  | 10 |
|     | Edge of snout obtusely angular ... ..   | 9  |
| 9.  | Preocular in contact with the second and third labials: (24 to 30 scales round the middle of the body, 26 to 32 anteriorly, diameter of body 21 to 32 times in total length).<br>Typhlops punctatus ( <i>Leach</i> ).                   |    |
|     | Preocular in contact with the second labial: (30 to 32 scales round the middle of the body 32 to 34 anteriorly, diameter of body 28 to 36 times in total length).<br>Typhlops bibroni ( <i>Smith</i> ).                                 |    |
| 10. | The portion of the rostral visible from below broader than long ... ..  | 11 |
|     | The portion of the rostral visible from below as broad as long: (30 to 36 scales round the body, diameter of the body contained 25 to 30 times in the total length).<br>Typhlops mucroso ( <i>Peters</i> ).                             |    |
| 11. | 40 to 42 scales round the middle of the body, diameter of body contained 25 to 30 times in the total length.<br>Typhlops schlegeli ( <i>Bianconi</i> ).   |    |
|     | 28 to 30 scales round the middle of the body, diameter of body contained 35 to 50 times in total length.<br>Typhlops delalandi ( <i>Schlegel</i> ).   |    |
| 12. | Snout hooked, the preoral portion concave inferiorly, rostral extending far beyond the posterior border of the eye.<br>Glaucônia distanti ( <i>Boulenger</i> ).   |    |
|     | Snout not hooked, rostral extending at the most only slightly beyond the posterior border of the eye ... ..   | 13 |



34. Præocular not extending to the upper surface of the head.  
*Boodon infernalis Guenther.*  
 Præocular extending to the upper surface of the head ... 35
35. Scales in 23 rows. *Boodon guttatus (Smith).*  
 Scales in 25 to 31 rows ... 36
36. Two pairs of chin-shields in contact on the median line.  
*Boodon lineatus Dum. & Bibr.*  
 Only one pair of chin-shields in contact on the median line.  
*Boodon mentalis Guenther.*
37. A single pair of chin-shields. *Lamprophis fiskei. Boulenger.*  
 Two pairs of chin-shields ... 38
38. Loreal only a little longer than deep ... 39  
 Loreal two or three times as long as deep.  
*Lamprophis inornatus. Dum. & Bib.*
39. Scales in 19 rows, 7 upper labials.  
*Lamprophis fuscus Boulenger.*  
 Scales in 23 rows, 8 upper labials. *Lamprophis aurora (L.)*
40. Scales without apical pits ... 39  
 Scales with apical pits ... 41
41. Two pairs of chin-shields ... 42  
 Three or four pairs of chin-shields.  
*Leptodira hotambœia (Laur.)*
42. Nostril between two nasals, two labials entering the eye.  
*Ablabophis rufulus (Licht.)*  
 Nostril in a single nasal followed by a small post-nasal, three  
 labials entering the eye. *Lycophidium capense (Smith).*
43. Scales in 17 rows ... 44  
 Scales in 15 rows ... 46
44. Nostrils between two or three shields ... 63  
 Nostril in a semi-divided nasal ... 45
45. Less than 150 ventrals, with apical pits.  
*Amplorhinus multimaculatus Smith.*  
 More than 150 ventrals, no apical pits.  
*Grayia lubrica Slater.*
46. Nasal not in contact with præocular, usually two postoculars ... 47  
 Nasal in contact with præocular, one postocular.  
*Homalosoma shiranum Guenther.*
47. More than 115 ventrals. *Homalosoma lutrix (L.)*  
 Less than 110 ventrals. *Homalosoma variegatum Peters.*
48. Pupil round ... 50  
 Pupil vertical or horizontal ... 49
49. Pupil vertical. *Tarbophis semiamniatus (Smith).*  
 Pupil horizontal. *Theltonis kirtlandi (Hallow.)*
50. Scales in 27 or more rows. *Pseudaspis cana (L.)*  
 Scales in less than 27 rows ... 51
51. Scales in 19 to 21 rows ... 52  
 Scales in 17 or less rows ... 53
52. Ventrals 131 to 149, scales not oblique.  
*Tropidonotus olivaceus (Peters).*  
 Ventrals 164 to 201, scales very oblique.  
*Dispholidus typus (Smith).*
53. Scales in 17 rows ... 55  
 Scales in 15 rows ... 54
54. Temporals 1 & 1, or 1 & 2... 25  
 Temporals 2 & 2, or 2 & 3 ... 58



55.	Nostril between two nasals and the internasal.	
	Trimerorhinus ... ..	56
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## The Amaryllidaceæ of the Transvaal.

By R. LEENDERTZ.

### INTRODUCTION.

The bulbous plants, though they have mostly showy, bright-coloured flowers, seem to have been neglected by the collectors, for in most Herbaria they are but poorly represented. It is true, the Lilies and Amaryllids with the generally big bulbs and thick leaves are difficult to preserve, and the flowers and leaves in many species appearing at a different time, the specimens are often incomplete.

The collections of Transvaal Amaryllids in the Herbaria are but small ones and the record for the Transvaal of 11 genera with 36 species is certainly too low. It will be far higher when several districts of the Transvaal, *e.g.* Zoutpansberg, visited by but very few collectors, will have been more thoroughly explored.

However, it will take some considerable time yet, until sufficient material is brought together, and for this reason I thought it advisable to commence providing some literature on the subject, however incomplete, if only to stimulate lovers and students of Botany in different outlying districts to send us more material.

Only where I had fresh material or herbarium specimens I have given descriptions of the species; for the other ones I have referred to the Flora Capensis VI. where Mr. Baker has worked out the South African Amaryllidaceæ.

Agave is included in the Transvaal genera of Amaryllidaceæ, although it is an American genus.

On account of its usefulness in forming hedges round the farms, it has been planted everywhere and is now growing wild. It thrives very well here, as its native land, Mexico, has much the same climate as South Africa.

I have followed Engler & Prantl in removing Vellozia, in Baker and Bentham and Hooker belonging to the family of Amaryllidaceæ, to the family of the Velloziaceæ, which has two genera, viz.:—

- a.* Vellozia with many stamens in South America;
- b.* Barbacenia with 6 stamens in South Africa.

According to this, Vellozia, our Baboon's Tail or Baviaan's-stert, must be altered into Barbacenia.

A list of species and many of the locality records were kindly furnished to me by J. Burt-Davy, Esq., Botanist and Agrostologist to the Transvaal Department of Agriculture, from his card-catalogue of Transvaal plants. Dr. Harry Bolus, of Kenilworth, near Capetown, was also kind enough to give me a list of localities of Transvaal Amaryllids, represented in his splendid Herbarium.

#### AMARYLLIDACEÆ, NARCISSUS-FAMILY.

(Fl. Cap. Vol. VI., 171.)

Flowers regular or irregular, always hermaphrodite. Perianth coloured, tubular with 6-parted limb or 6-parted to the base. Stamens 6; anthers introrse. Ovary inferior, 3-loculed; style entire; stigma entire or 3-lobed. Fruit a capsule or a berry, mostly with few seeds.

Generally stemless, bulbous plants with radical, ensiform or linear leaves and handsome, bright-coloured flowers, which are entomophilous, rarely ornithophilous.

Closely related to the Liliaceæ, but at once distinguished by the inferior ovary.

The Amaryllidaceæ are widely spread in the tropical and sub-tropical regions of both hemispheres; only few are found in temperate regions. The Cape Flora especially is rich in representatives. The bulbs of some genera are poisonous and of others are used as medicines; the leaves of a few genera supply fibre for ropes.

In the Transvaal we find till now (perhaps more may be found) 11 endemic genera with 36 species and one American genus (Agave), escaped from cultivation.

#### SYNOPSIS OF THE GENERA.

Subterranean part of plant a corm. Flowers in corymbs or racemes with often discoloured perianth. Fruit a capsule. Stemless plants with radical leaves.

##### *Hypoxidoideæ.*

Only one genus.

##### 1. *Hypoxis*.

Subterranean part of plant a rhizome. Flowers in racemes or panicles on a very long, stout peduncle. Fruit a fleshy capsule. Stem with very short internodes and whorls of very large, thick and fleshy leaves.

##### *Agavoideæ.*

Only one genus.

##### 2. *Agave*.

Subterranean part of plant a bulb. Flowers in umbels or solitary with coloured perianth. Fruit a capsule or a berry. Stemless plants with radical leaves.

##### *Amaryllidoideæ.*



Perianth tubular.

Ovary hidden in tunics of bulb neck.

3. *Apodolirion*.

Ovary free.

Bracts, surrounding the inflorescence, 2, rarely 3 or 4.

Perianth-tube long, 1-4 in.

Perianth-tube and segments of about the same length : bracts always 2, large and deltoid.

4. *Crinum*.

Perianth-tube 2 or 3 times longer than the segments : bracts 2-4, lanceolate.

5. *Cyrtanthus*.

Perianth tube short, less than 1 in. long.

Flowers solitary or 2-10 in an umbel, white or yellow.

6. *Anoiganthus*.

Flowers many in an umbel, always more than 10, rose-red or red.

Perianth irregular, large, with oblong-lanceolate segments.

7. *Brunswigia*.

Perianth regular, small, with linear segments.

8. *Buphane*.

Bracts, surrounding the inflorescence, many.

Perianth regular, segments equal, linear or lanceolate.

9. *Hæmanthus*.

Perianth irregular, segments unequal, the outer narrower than the inner.

10. *Clivia*.

Perianth cut down to the base or nearly so, segments spreading.

Stamens of different length, anthers dorsifixed.

11. *Nerine*.

Stamens of same length, anthers basifixed.

12. *Hessea*.

## DESCRIPTIONS OF THE GENERA AND SPECIES.

### 1. HYPOXIS, L. (F.C. VI., 174.)

Perianth segments free, equal, spreading, the outer hairy on the outside as in all Transvaal species : stamens inserted at the base of the segments, filaments short, filiform, anthers linear, sagittate, basifixed or dorsifixed : ovary 3-loculed, style short, stigmata 3, free or concrete : capsule usually opening at the top : seeds round, black.—Flowers yellow, hairy outside, solitary or in racemes and corymbs : the

spread-out flowers look like yellow stars and are called, "Wilde Morgenster" and "Wilde Tulp." Leaves more or less hairy, linear, lanceolate and plicate, persistent.

The very long, tough and strong leaves of some species are used by the Kaffirs in making ropes with which they tie up the bundles of grass for the roof of their huts. Largely spread at the Cape, extending to tropical Africa, Australia and a great part of America. More than 50 known species, of which 14 occur in the Transvaal.

*Key to the Species.*

Perianth small,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long.

Leaves subterete.

Flowers one or two, corm very small,  $\frac{1}{4}$ - $\frac{1}{3}$  diam.

1. *H. filiformis*.

Flowers 2-5 corymbose, corm  $1\frac{1}{2}$ -2 in. diam.

2. *H. Kraussiana*.

Leaves linear.

Leaves silky.

3. *H. argentea*.

Leaves hairy, but not silky.

4. *H. Gerrardi*.

Leaves lanceolate or oblong-lanceolate.

Flowers corymbose.

Leaves membranous.

5. *H. membranacea*.

Leaves rigid.

Leaves shorter than the peduncles.

6. *H. parvifolia*.

Leaves longer than the peduncles.

7. *H. villosa*.

Flowers racemose.

8. *H. obtusa*.

Perianth larger,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long.

Leaves linear.

Leaves weak : peduncle single.

9. *H. acuminata*.

Leaves rigid : peduncles 2-3.

10. *H. rigidula*.

Leaves lanceolate or oblong-lanceolate.

Flowers corymbose, few.

11. *H. multicaps*.

Flowers racemose, many.

Lower pedicels very short.

Leaves nearly glabrous.

12. *H. Galpini*.

Leaves densely ciliated on the margin.

13. *H. costata*.

Lower pedicels  $\frac{1}{2}$ -1 in. long, leaves glabrous or nearly glabrous above, hairy on the back and margin.

14. *H. Rooperi*.

1. *H. filiformis*, *Baker*. Corm very small,  $\frac{1}{4}$ - $\frac{1}{3}$  in. diam. with a long neck and membranous tunics ; leaves 6, subterete, strongly ribbed, loosely hairy, 3-9 in. long, under 1 line

wide; peduncles 1-2, slender, hairy, 1-5 in. long, 1-2 flowered: perianth  $\frac{1}{4}$  in. long, pale yellow, greenish and hairy outside; stamens half as long as perianth, anthers deeply sagittate; ovary densely hairy, stigmas concrete.

Saddleback Range, near Barberton, 4500-5000 ft., Galpin, 1101; Makapansgat, Zoutpansberg, in vleis, flowering September and October, Miss Leendertz, 894; Engelsche Doornboom, Pretoria District, flowering December, Janse in Transvaal Museum Herbarium, 3023; Dalriach, near Mbabane, Swazieland, Bolus, 12359.

2. *H. Kraussiana*, Buch. (F.C. VI., p. 180, No. 14.) Johannesburg, Galpin, 6177; Swazieland, Galpin, 984.

3. *H. argentea*, Harv. Corm ovoid with a long neck, crowned with a ring of bristles; leaves 6-12, linear, acuminate, firm in texture, 4-6 in. long, 1-1 $\frac{1}{2}$  line wide, densely silky with long hairs on both sides; peduncles 2, slender, densely silky, shorter than the leaves; flowers 2, corymbose, pedicels hairy,  $\frac{1}{2}$  in. or more long, bracts small, narrow; perianth-segments  $\frac{1}{4}$  in. long, the outer ones densely hairy; stamens very short, anthers deeply sagittate; ovary silky, stigmata concrete.

Pretoria, flowering in November, common in good soil and stony places, Burt-Davy, 716; plains round Pretoria, 4000 ft., Bolus, 176; Irene, flowering October, Miss Leendertz, 916.

*Var. flaccida*, Baker. (F.C. VI., 182, var.)

4. *H. Gerrardi*, Baker. Corm oblong, 2 in. long,  $\frac{1}{2}$  in. diam., crowned with many long bristles and with a long neck; leaves 6-10 linear, rigid, strongly ribbed, 4 in. long at the flowering time, 1 line wide, short and softly pilose all over; peduncles 2 or 3, slender, hairy, longer than the leaves; flowers 2-4, pedicels densely hairy,  $\frac{1}{2}$  in. long, bracts small, linear; perianth-segments  $\frac{1}{4}$ - $\frac{1}{3}$  in. long, the outer ones densely hairy on the back; stamens short; ovary densely pilose.

Koedoespoort, near Pretoria, Miss Leendertz, 645; without precise locality, McLea in Herb., Bolus, 12594.

5. *H. membranacea*, Baker. Corm very small with a long neck; leaves 4-8, oblong-lanceolate, membranous, 1-3 in. long,  $\frac{1}{2}$  wide at the middle, thinly hairy with long, soft hairs; peduncles 1-2, very slender, hairy, two-flowered, pedicels as long as the peduncle; perianth  $\frac{1}{4}$  in. long, whitish-yellow, hairy on the outside; stamens nearly as long as the perianth-segments; ovary hairy.

Swazieland, Galpin, 1049.

6. *H. parvifolia*, Baker. Corm oblong,  $\frac{1}{2}$  in. diam., crowned with a dense ring of bristles; leaves 4-8, oblong-lanceolate, firm, strongly ribbed, slightly hairy, 1-2, in. long;

peduncles 3-4, very hairy with long white or yellowish hairs, 2-3 in. long, inflorescence included, two-flowered; bracts lanceolate, longer than the pedicels; perianth pale yellow, densely hairy on the back; stamens half as long as the perianth-segments or shorter; ovary very hairy.

Summit of Saddleback Range, near Barberton, 5000 ft., Galpin, 1059; Kopjes round Pretoria, flowering October, Miss Leendertz, 312; Irene, Miss Leendertz, 917.

7. *H. villosa*, L. (F.C. VI., 184, No. 27.) The variety var. *obliqua*, Jacq., occurs at Barberton, 2900 ft., Thorncroft, 43.

8. *H. obtusa*, Burch. (F.C. VI., 184, No. 28.) Saddleback Range, near Barberton, 3200-4500 ft., Galpin, 412; Johannesburg, Galpin, 6073.

9. *H. acuminata*, Baker. (F.C. VI., 186, No. 32.) Houtbosch, Pietersburg, Bolus, 11174.

10. *H. rigidula*, Baker. Corm oblong; leaves 5-6, very rigid, strongly ribbed, shortly pilose, 1-1½ ft. long, ¼-½ in. wide; peduncles 2-3, flattened, hairy, very long when the plant is in fruit; flowers 3-8, racemose, pedicels very short; bracts linear, ½-1 in. long; perianth nearly ¾ in. long, the segments densely pilose on the back; filaments short; capsule densely pilose, opening at the top.

Flowering time, February and March.

Wonderfontein, Nelson, 261; Davel, Burt-Davy, 1657; Vlakfontein, Rogers in Transvaal Museum Herb., 2342.

*Var. pilosissima*, Baker. Leaves, peduncles and perianth covered with denser, longer hairs. Flowering time, October, November and December; used for ropes by the Kaffirs.

Pretoria, Magaliesberg, Burke, 156; Kopjes round Pretoria, Miss Leendertz, 313; Barberton, Galpin, 1099; Warmbaths, Burt-Davy, 2218; Zoutpansberg, Waterval-Boven.

11. *H. multiceps*, Buch. (F.C. VI., 187, No. 35.) Barberton, 4500 ft., Galpin, 1058.

12. *H. Galpini*, Baker. (F.C. VI., 188, No. 40.) Saddleback Range, near Barberton, 4000-5000 ft., Galpin, 1098.

13. *H. costata*, Baker. Corm globose with many strong bristles; leaves 5-10, oblong-lanceolate, rigid, closely ribbed, 5-8 in. long at the flowering time, 1-1½ in. wide at the middle, densely ciliated with long hairs on margins and midrib beneath, otherwise glabrous; peduncles 1-4, as long or longer than the leaves, densely hairy; flowers few in a raceme, bracts linear; perianth-segments very hairy on the back; filaments short; ovary densely hairy.

Flowering time, January.

Oshoek, Wakkerstroom District, Devenish in Col. Herb., 54.

14. *H. Rooperi*, Moore. Corm globose, 2-4 in. diam., with many fleshy rootlets, crowned with a dense ring of black bristles: leaves 12-18 or more, equitant in 3 ranks, lorate, acuminate,  $\frac{1}{2}$ -1 ft. long at the flowering time, 1-2 in. wide in the lower half, rather firm in texture, glabrous or nearly so above, shortly hairy on the back and margin; peduncles 2-9, flattened, hairy upwards, 3-12 in. long; flowers 4-10, racemose; bracts linear, as long or longer than the pedicels; perianth-segments oblong, yellow,  $\frac{3}{4}$  in. long, the outer hairy on the back; anthers longer than the filaments; ovary very hairy; stigmata concrete; capsule densely hairy, opening at the top, seeds black, shining.

Flowering September, October, November.

Potchefstroom District, Mooi River, Nelson, 302; Houtbosch, Rehmann, 5810; Barberton, 1800-2600 ft., Galpin, 1190; without precise locality McLea in Herb. Bolus, 5801; Zoutpansberg; common round Pretoria, Miss Leendertz, 274; Irene, Miss Leendertz, 919.

## 2. AGAVE. L.

Perianth regular, funnel-shaped with a short or long tube, segments straight or spreading, linear; stamens longer than the perianth, filaments filiform, anthers dorsifixed; ovary oblong, stigma slightly three-lobed; fruit a capsule; seeds flattened.—Plants with fleshy, thick leaves, prickly on the margin, or with thin and entire leaves, often glaucous; flowers yellowish or greenish, in panicles or spikes. The plants grow very slowly and it generally takes a very long time before they flower.

An American genus with 50 species in Mexico, South America and the Southern parts of North America. Many are in cultivation: escaped from it and occurring everywhere in the Transvaal, is:—

*A. americana*, L. Leaves in a dense rosette, very large and thick, with sharp prickles on the margin, glabrous and glaucous; peduncle 1, very long and stout, covered with bracteiform leaves and ending in an enormous panicle of yellowish-green flowers.

A native of Mexico, very important on account of its usefulness as a fibre-plant (false Manilahemp), spread over all tropical and sub-tropical regions. Known in the Transvaal under the names of "Aloe" and "Garenhout" and used as a hedge plant and as fodder for cattle in times of drought.

## 3. APODOLIRION, BAKER. (F.C. VI., 197.)

Perianth with a long tube and lanceolate segments; stamens in two rows, 3 inserted at the throat and 3 below the throat of the perianth-tube, filaments very short, anthers



basifixed; ovary hidden in the upper sheaths of the bulb. Small plants with the habit of Saffron and Meadow-saffron and white or red solitary flowers; leaves linear, generally produced after the flowers.

A South African genus with 4 species, of which 2 occur in the Transvaal.

*Key to the Species.*

Perianth-tube 1-1½ in. long. 1. *A. Elta*.

Perianth-tube 6-8 in. long. 2. *A. Mackenii*.

1. *A. Elta*, *Baker*. (F.C. VI., 197, No. 2.) Barberton, 4000-5000 ft., Galpin, 436.

2. *A. Mackenii*, *Baker*. (F.C. VI., 198, No. 6.) Schlechter, 3327, Houtboschrand, is near this species.

4. CRINUM, L. (F.C. VI., 198.)

Perianth funnel-shaped, tube very long, segments oblong, generally as long as the tube; stamens inserted at the throat of the tube, filaments long, filiform, anthers linear, dorsifixed; ovary oblong, ovules often sunk down in the thick placenta, style long, filiform, stigma round; capsule membranous, bursting irregularly; seeds large, bulbiform.

Plants with large, showy flowers, white, or white, tinged with red in many- or few-flowered umbels; bracts large, 2; leaves long, linear or lorate, produced with the flowers. The bulbs of many species are used as medicines.

A genus with over 60 species, spread through the tropical and sub-tropical regions of the Old and New Worlds, growing mostly near the coasts.

One species occurs in the Transvaal, known under the name of St. Johns Lily.

1. *Cr. longifolium*, *Thunb.* Bulb very large, ovoid; leaves many, lorate, green, rather firm in texture, more than a foot long at the flowering time, 2-2½ in. wide, scabrous on the margin; peduncle flattened, nearly 1 ft. long; flowers 6-12 or more to an umbel; bracts 5 in. long, 1½ in. wide at the middle; pedicels short; perianth curved, white with red stripes; stamens shorter than perianth-segments or nearly as long; filaments filiform, white; style filiform, nearly as long as perianth-segments; capsule membranous, seeds 1-6. bulbiform, germinating when still in the capsule.

The most extensively cultivated species of the genus, often found in European gardens.

Common near Pretoria, flowering October and November, Miss Leendertz, 964; MacLea in Herb. Bolus, 5941; Rustenburg, Miss Nation, 356; Wakkerstroom District; Heidelberg.

*Cr. pauciflorum*, Baker, is given in Durand & Schinz "Conspectus Floræ Africae" as a Transvaal species, but having neither description nor specimens of it, we must leave it for the present.

NOTE.—The capsule is given in Baker and Benthams and Hooker as few-seeded; in Engler and Prantl as many-seeded.

In the specimens I have examined the capsule is 1-6 seeded. The plant is viviparous, for the seeds germinate within the capsule, the roots piercing the fruit wall.

### 5. CYRTANTHUS, AIT. (F.C. VI., 218.)

Perianth funnel-shaped with a narrow tube, much longer than the segments, dilated gradually upwards to the throat, segments oblong, nearly equal; stamens inserted in the tube, filaments filiform, long or short, anthers dorsifixed, ovary 3-loculed, style long, filiform, stigma more or less 3-lobed, capsule many-seeded, seeds flattened, black.

Plants with pendulous or erect, usually white or red flowers, solitary or in few- or many-flowered umbels, surrounded by 2-4 greenish, lanceolate bracts; leaves linear or lorate, produced with or after the flowers. The genus takes its name from the curvature of its flower.

A species with white flowers is called the Ifafa-Lily. A South African genus with 15 known species, of which 5 occur in the Transvaal.

#### *Key to the Species.*

Flowers yellow.

1. *C. lutescens*.

Flowers bright red.

Umbel many-flowered, 4-10 in an umbel.

Perianth  $1\frac{1}{4}$  in. long.

2. *C. parviflorus*.

Perianth  $1\frac{1}{2}$ -2 in. long.

3. *C. angustifolius*.

Umbel few flowered, 2-3 fl. in an umbel, or flower solitary.

Flowers always single, leaves linear.

4. *C. Galpini*.

Flowers single or 2-3 umbellate; leaves lanceolate, petiolated.

5. *C. sanguineus*.

1. *C. lutescens*, Herb. (F. C. VI., 225, No. 17.) Barberton, 5000-5500 ft., Galpin, 654, and without precise locality, Sanderson.

2. *C. parviflorus*, Baker. Bulb small; leaves linear, flaccid, more than 1 ft. long; peduncle slender,  $\frac{1}{2}$  ft. long; umbel 10 flowered, bracts two, lanceolate,  $1\frac{1}{2}$  in. long; pedicels  $\frac{1}{2}$ -1 in. long; perianth bright red, slightly curved, 1 in. long; segments not spreading, short, broad oblong; stamens 3, inserted at the throat of the tube, 3 within, filaments very short; style nearly reaching to the tip of the perianth-segments.

Saddleback Range near Barberton 4000-4500 ft., Galpin, 477; Barberton, flowering September, J. N. Thorncroft, 2757 in Transvaal Museum Herb.; between Mbabane and Bremersdorp, Swazieland, Bolus, 12362.

3. *C. angustifolius*, Ait. (F.C. VI., 223, No. 14). Hills near Barberton, 4000 ft. Thorncroft, 156; Ermelo, flowering October; without precise locality, Sanderson.

4. *C. Galpini*, Baker. (F.C. VI., 227, No. 24.) Barberton, rocky hill sides, 3000 ft., Galpin, 409.

5. *C. sanguineus*, Hook. (F.C. VI., 227, No. 23.) Barberton, among rocks, 3000 ft. Thorncroft, 157.

#### 6. ANOIGANTHUS, BAKER. (F.C. VI., 193.)

Perianth with a short tube and lanceolate, ascending segments; stamens in 2 rows, 3 inserted in the tube and 3 at its throat; filaments filiform, anthers basifixed, deeply sagittate; ovary many-ovuled, style filiform, stigma 3-lobed; capsule many-seeded; seeds flat.—Plants with the habit of the snowdrop and white or yellow flowers; leaves linear, produced with the flowers.

A South African genus with one species and a variety of it, both occurring in the Transvaal.

1. *A. breviflorus*, Baker. (F.C. VI., p. 193, No. 1.) Swazieland, 4000 ft., Galpin, 1097, Hlatikulu, Swazieland, Miss Stewart in Herbarium Bolus.

1A. *Var. minor*, Baker. A dwarf plant: bulb  $\frac{1}{2}$  in. diam. with a rather long neck and membranous, white tunics; leaves 3-5, linear, erect, obtuse, glabrous, 2-5 in. long, 1-1 $\frac{1}{2}$  line wide; peduncle 1-1 $\frac{1}{2}$  in. long; pedicels  $\frac{1}{2}$ -1 in. long; bracts 2, linear, acuminate, longer than the pedicels; flowers 1-3, pale yellow, with narrow perianth-segments; stamens half as long as perianth-segments; style longer, ovary small, globose, green.

Johannesburg, Galpin, 6178; Zwartkrans, Zoutpansberg, in vleis, flowering September, Miss Leendertz, 890; Brugspruit, flowering October, in Transvaal Museum Herb. 3428.

#### 7. BRUNSWIGIA, HEIST. (F.C. VI., 204.)

Perianth curved with a short tube and narrow, oblanceolate segments; stamens inserted in the tube, more or less curved, three shorter, filaments filiform, anthers dorsifixed; ovary turbinate, style filiform, curved; capsule acutely triangular, narrowed gradually into the long pedicel; seeds roundish.—Plants with large bulbs and bright red, arge and showy flowers in many-flowered umbels; leaves

mostly broad, lying nearly on the ground. Flowers generally very long-stalked, from which peculiarity the vernacular name of "Candelabra Flower" is derived.

A South African genus with 9 known species, of which one occurs in the Transvaal.

1. *B. Cooperi*, Baker. Bulb large, ovoid, with pale brown, membranous tunics: leaves 4-6, lingulate, spreading almost horizontally, 9 in. long, 4 in. wide at the middle, thick, many and closely veined, margin thickened and scabrous: peduncle round, a foot or more long: flowers many in an umbel, bright red, pedicels 3-4 in. long; bracts two, ovate, nearly 2 in. long; perianth 2-2½ in. long; stamens as long as perianth-segments: style a little longer.

Barberton, Galpin, 1222: Nelspruit, Rogers, in Transvaal Museum Herbarium, 2276: Belfast, Bolus, 12365.

#### 8. BUPHANE, HERB. (F.C. VI., 242.)

Perianth regular with short, straight tube: segments narrow, spreading, linear or lanceolate; stamens inserted at the throat of the tube, filaments long, filiform, anthers dorsifixed: ovary turbinate, ovules few, round, style filiform, stigma slightly three-lobed, capsule membranous, indehiscent, seeds few, bulbiform.—Plants with large bulbs and rose-red or dark red, small flowers in very dense umbels: leaves many, lorate or lingulate, firm in texture, appearing after the flowers.

A South African genus with few species, of which one occurs in the Transvaal, extending to Tropical Africa.

1. *B. toxicaria*, Thunb. "Poison bulb" or "Giftbol". Bulb very large, 6-8 in. diam. with many hundreds of tunics, the outer, brown, firm in texture: leaves appearing after the flowers, ensiform, distichous, firm, bluish-green, closely ribbed, acuminate, hairy on the margin, 1-1½ ft. long, 1-1¼ in. wide: peduncle short, stout, flattened: bracts deltoid, longer than the pedicels, perianth dark red, segments linear, reflexed; filaments red, longer than the segments, anthers yellow, dorsifixed; ovary turbinate, tapering gradually into the angular pedicels, style red, nearly as long as the stamens.

The inflorescence in fruit is called the "Windwaaier", consisting of very many triangular capsules on very long stalks, the pedicels having grown out to six times their length. Seeds in a capsule 3 or less, white, bulbiform. The seed germinates in the closed capsule, the young root breaks through the thin fruitwall and gradually the first leaves to appear through the opening, which becomes larger, thus giving opportunity to the young plant to become free and to grow on,



where it finds a good condition to thrive. The Windwaaier does not remain long connected with the plant, but breaks off, is caught by the wind, it being very light, rolls over the ground, in this way serving for the distribution of the young plants.

“Buphane” is the Greek name for “death to cattle”.

Horned cattle are very fond of the leaves, but are said to prove fatal when eaten by them. With the sap of the bulb the Hottentots are said to poison their arrows.

The plant flowers in October on sunny spots on the Kopjes round Pretoria : Miss Leendertz, 351.

NOTE.—I have not found it mentioned in any book that Buphane is viviparous, nor that the fruit is indehiscent.

I collected a “Windwaaier” in November and soon I saw the first roots break through the membranous fruitwall, followed by the green leaves.

As far as May I saw the germinating of the large bulbous seeds, tender young roots and green leaves hanging out from the pierced capsule.

## 9. HAEMANTHUS, L. (F. C. VI., 229.)

Perianth straight, erect with a short tube, segments longer than the tube, linear or lanceolate, spreading or ascending ; stamens inserted at the throat of the tube, filaments filiform, often longer than the segments, anthers dorsifixed : ovary 3-loculed, style filiform, stigma slightly 3-lobed : berry globose, often bright coloured, seeds few, round.

Plants with red or white, small flowers in dense capitate umbels, surrounded by many erect or spreading, often coloured bracts : leaves mostly thick and fleshy, broad and obtuse, produced with or after the flowers. The bulb has sharp qualities and is often used as a household medicine. Many species are in cultivation on account of the showy flowers.

A South African genus with 50-60 species at the Cape, extending into tropical Africa : 6 species occur in the Transvaal.

### *Key to the Species.*

Leaves membranous.

Bracts and perianth segments spreading : flowers bright red. 1. *H. Katharinæ*.

Bracts and perianth-segments persistently ascending.

Leaves distinctly petiolated ; flowers pale scarlet.

2. *H. puniceus*.

Leaves not petiolated : flowers bright red.

3. *H. magnificus*.



Leaves thick and fleshy.

Bracts white, veined with green, flowers pure white.

4. *H. albiflos*.

Bracts reddish ; flowers pink or white.

Bracts and perianth-segments spreading.

5. *H. amarylloides*.

Bracts and perianth-segments permanently ascending.

6. *H. hirsutus*.

1. *H. Katharinae*, *Baker*. Bulb globose : leaves 3-5, produced with the flowers, oblong, membranous, bright green, distinctly many veined, petiolated, lamina 6 in. long and 2-3 in. wide, petiole 3 in. long, spotted ; leafy stem short ; peduncle distinct from the leaves, spotted low down, long ; umbel globose, 6 in. in diam. ; pedicels 1 in. long ; bracts 5-6, lanceolate, thin, reflexed ; perianth bright red, segments lanceolate, narrow, reflexing ; filaments flattened, ascending, bright red, longer than the perianth-segments, anthers yellow ; ovary round, green, style ascending, longer than the filaments.

Barberton, stony ground at base of hills, 2000 ft., Galpin, 711.

2. *H. puniceus*, *L.* (F. C. VI., 231. No. 2.) Barberton, Galpin, 673.

3. *H. magnificus*, *Herb.* Bulb globose,  $2\frac{1}{2}$ -3 in. diam. with many long, very fleshy rootlets : leafy stem spotted with red brown, 5-6 in. long at the flowering time ; leaves 6-8, oblong, membranous, bright green, undulated, distinctly many-veined, transverse veinlets close and oblique, 12-15 in. long, 3-5 in. wide, narrowed to a clasping base : peduncle lateral, stout, about a foot long ; umbel globose, very dense, large ; bracts 6-8, oblong, ascending,  $2-2\frac{1}{2}$  in. long, greenish, reddish to dark red, shorter, as long or overtopping the flowers ; perianth bright red, segments twice as long as tube ; filaments bright red, longer than the perianth, anthers yellow ; style as long as stamens ; berry bright red, as big as a small cherry.

Common round Pretoria, Miss Leendertz, 650 ; Irene, Miss Leendertz, 920 ; Rietfontein (Zoutpansberg), Miss Leendertz, 871. Flowering time, October and November.

The vernacular name is "Oogzeer-bloem".

NOTE.—The mostly bright-coloured Amaryllids, often standing in dense inflorescences, are of course entomophilous, but nowhere have I found anything about their being ornithophilous. In a kloof at Rietfontein, Zoutpansberg, I saw the above described *Hæmanthus* visited by a Sun-Bird. The bird placed itself upon the middle of the umbel and turning round and round, it sucked the honey from out the flowers.

4. *H. albiflos*, *Jacq.* (F.C. VI., 235, No. 11.) A variety at Barberton, Moodies, 4000 ft., Thorncroft, 361.

5. *H. amarylloides*, Jacq. Bulb ovoid, : leaves two, produced with the flowers, lingulate, obtuse, bright green, glabrous, 6-12 in. long,  $1\frac{1}{2}$ -2 in. wide : peduncle slender, glabrous,  $\frac{1}{2}$  ft. long : flowers in a dense globose umbel, 50 or more : bracts 6, pink, oblong-lanceolate, spreading : perianth white, segments lanceolate, tube very short : stamens and style nearly as long as perianth-segments : berry oblong, blackish.

Mooi Rivier, Burke : Wolmaransstad, flowering December, Mainwaring, in Transvaal Museum Herbarium, 2794.

6. *H. hirsutus*, Baker. Bulb rather large ; leaves 2, produced with the leaves, oblong, 5-6 in. long at the flowering time,  $3\frac{1}{2}$ -4 in. wide, nearly erect, very obtuse, shortly hairy on both surfaces, pale beneath, the hairs on the margin longer : peduncle longer than the leaves, densely and softly hairy ; umbel globose : bract 6-8, oblong, membranous, bright red, ascending or spreading : perianth white or pink, segments very narrow, lanceolate, obtuse, much longer than the tube : filaments white, anthers small, pale yellow : ovary green, style as long as the stamens.

Barberton, 4000-5000 ft. Galpin, 1183 : Ermelo, flowering December, Burt-Davy, 2191.

#### 10. CLIVIA, LINDL. (F.C. VI., 228.)

Perianth funnel-shaped with short tube, curved or straight, segments much longer than the tube, the three outer narrower than the 3 inner : stamens inserted at the throat of the tube, filaments filiform, nearly as long as the perianth-segments, anthers dorsifixed ; ovary round, 3-loculed, style long, filiform, stigma 3-lobed ; berry bright red, pulpy, seeds few, large, bulbiform.—Plants with showy, red-yellow flowers and therefore frequently grown in gardens ; leaves many, lorate, distichous, fully developed, when the plant flowers ; bulb imperfect, rootlets numerous, thick, fleshy.

A South African genus with 3 species of which 2 occur in the Transvaal.

#### *Key to the Species.*

Umbel dense, 40-60 flowered : leaves not narrowed to the tip, obtuse. 1. *C. nobilis*.

Umbel less dense, 12-20 flowered, leaves narrowed gradually to the tip. 2. *C. Gardeni*.

1. *C. nobilis*, Lindl. (F.C. VI., 228, No. 1.) Barberton, 4000-4650 ft. Galpin, 1102.

2. *C. Gardeni*, Hook. (F.C. VI., 228, No. 2.) Barberton, Saddleback Mountains, Thorneroft, 280 : Transvaal, Hort. Nelson.

## 11. NERINE, HERB. (F.C. VI., 209.)

Perianth regular or irregular with narrow, more or less crisped, spreading segments; stamens inserted at the base of the segments; filaments thickened at the base and often united, three shorter, anthers dorsifixed; ovary 3-loculed, few ovuled, style filiform, stigma slightly 3-lobed; capsule deeply 3-lobed: seeds globose, one or few in a cell.—Flowers red or rose-red in few- or many-flowered umbels; bracts 2, lanceolate, leaves linear, produced with or after the flowers.

A South African genus with 9 species at the Cape and 3 in the Transvaal: many are in cultivation on account of the showy flowers. *Nerine sarniensis*, the Guernsey Lily, is, notwithstanding its name, a native of Table Mountain. It is said it obtained the name in this way. In 1680 a ship wrecked on the shore of Guernsey, and having quantities of bulbs of *N. sarniensis* on boardship, these were thrown ashore and became cultivated on the Isle.

*Key to the Species.*

Peduncle long,  $1\frac{1}{2}$ -3 ft. long.

Leaves 1 in. wide.

1. *N. flexuosa*.

Leaves  $\frac{1}{8}$ - $\frac{1}{4}$  in. wide.

2. *N. angustifolia*.

Peduncle short, 3-8 in. long.

3. *N. lucida*.

1. *N. flexuosa*, Herb, var. *Sandersoni*, Baker. (F.C. VI., 211, No. 4, var.) Barberton, Moodies, 4000 ft., near streams, Thorncroft, 444; without precise locality, Sanderson.

2. *N. angustifolia*, Baker. Bulb small: leaves linear, 1 ft. long,  $\frac{1}{8}$ - $\frac{1}{4}$  in. wide, appearing with the flowers: peduncle stiff, erect, long: umbel many-flowered, bracts ovate-lanceolate, coloured; pedicels very hairy: perianth-segments pink, scarcely at all crisped: stamens shorter than the perianth-segments: ovary hairy, style as long as the stamens.

Sterk Hill, Lydenburg, flowering in June, growing in boggy ground on shady spots, Burt-Davy, 453; Barberton, Galpin, 1018; Dahriach, Swaziland, Bolus, 12366.

3. *N. lucida*, Herb. (F.C. VI., 214, No. 13.) Without precise locality, Todd, 22.

## 12. HESSEA, HERB. (F.C. VI., 189.)

Perianth regular with spreading, obtuse segments: stamens inserted at the base of the segments, filaments filiform or flattened at the base, anthers small, basifixed: ovary globose, style subulate or swollen towards the base;

capsule few-seeded: seeds round, greenish.—Small plants with white or rosy, small flowers in many-flowered umbels, surrounded by two linear or lanceolate bracts: leaves linear, filiform or lorate, generally produced after the flowers.

The generic name is given in honour of the late Rev. Mr. Hesse, minister of the Lutheran congregation at Capetown.

A South African genus with 10 species at the Cape Colony and one in the Transvaal.

1. *H. Rehmanni*, *Baker*. (F.C. VI., 190, No. 4.)  
Donkershoek, Rehmann, 6549: Johannesburg, Miss Saunders,  
13, Galpin, 1370.

**On breeding experiments with *Cysticercus tenuicellus* Rud. from Sheep, and their development into mature *Taenia marginata* Batsch in the South African Jackal.**

By LEWIS HENRY GOUGH, Ph.D.

At post-mortems of sheep made last year at the Bacteriological Laboratory at Daspoort, the presence of *Cysticerci* much resembling *Cysticercus tenuicollis* Rud. was found with great regularity in most animals examined, and it was considered desirable to settle the question which species they really belong to.

By the kindness of Dr. Gunning, a jackal from the Zoological Gardens was placed at my disposal on October 30th, 1907, to serve as host in experiments to be made with the worms. The animal was dosed with arecolin and calomel. No signs of a previous infection were then observed.

The first two *Cysticerci* were given to the jackal on 4th November, 1907, a further one being administered 9th November, 1907, and a last one 11th November, 1907. The jackal taking them either wrapped in meat or free. I am indebted to the kindness of Dr. Theiler, the Transvaal Government Bacteriologist for the *Cysticerci*.

Three months after the first infection, on 3rd February, 1908, the jackal was slaughtered, and a post-mortem made; two mature specimens of *Taenia marginata* Batsch being found, besides a number of specimens of a *Dipylidium*.

The worms agree in every detail with the descriptions as given in the text-books, except that they are somewhat shorter than would be normal.

However, the number of hooks, size of ova, number of diverticula of the uterus, etc., and the projection of the hind-edge of the proglottids are all as in normal specimens.

An earlier experiment with *C. tenuicollis* was made with a bladderworm taken from a Thar, on 15th August, 1907, and fed to a jackal, the host being slaughtered 20th October, 1907. The worm in this case was not quite mature when taken from the host.



I have also observed the worms in a jackal from the Zoological Gardens, which had not been experimented with.

*Cysticercus tenuicollis* *Eud.* occurs in wild ruminants in South Africa ; on 29th October, 1906, I found 26 specimens in a duiker, *Cephalophus grimmii* (*L.*), which died in the Zoological Gardens, Pretoria.

It is interesting to note that this animal can, in South Africa, pass through its complete life circle within wild animals.

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**Note on a specimen of *Prosymna sundevalli***  
(*Smith*).

By LEWIS HENRY GOUGH, Ph.D.

A specimen of *Prosymna sundevalli* (*Smith*) received on 28th February, 1908, from Pretoria calls for a few remarks.

The specimen is 32 cm. long, of which three belong to the tail; the proportion of the tail to the body is thus smaller than that of the specimen recorded by Boulenger Cat. of Snakes, Vol. II., p. 248. The coloration is also remarkable, differing from the normal. The upper surface is a bright chestnut brown, each scale edged with darker, the vertebral row being bright yellow; several of the scales have white spots, the outer row is almost all white, the second row being white with a brown spot at the base of each scale.

The frontal and parietals are brighter chestnut than the rest of the body, a dark band runs from eye to eye in front of the frontal. There is no trace of the two rows of brown spots along each side of the back.

The scales of the head differ in following points from the normal; the frontal is only just as long as the parietals, and there are only six upper labials instead of seven or eight.

Ventrals 161, Anal 1, Sub-caudals 25.

The other two specimens of *P. sundevalli* (*Smith*) in the Museum (taken at Krabbefontein, Zoutpansberg) are normal in coloration and in the proportion of the frontal to the parietals, but vary in the same way with regard to the labials, having but six.

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## **Note on four Rock Engravings found in the Transvaal.**

By C. J. SWIERSTRA, First Assistant.

Through the courtesy of J. A. Naser, Esq., M.L.A., of Klerksdorp, the Museum came into possession of four rock-engravings found in the Klerksdorp District, Transvaal.

These engravings represent the Eland, Gensbuck, the Cape Ant-Eater and the Guinea Fowl, and are sculptured in one of our hardest rocks, viz., Crystalline Diabase.

They are very good reproductions of the animals they represent, and one is struck by the perfectness with which most of the details have been sculptured out; and although now they have weathered away almost to the same colour as the rest of the surface, they must have once, when just finished, been most conspicuous objects, presenting a beautiful slatish blue picture on the original weathered reddish grey surface of the rock.

They have been lying in the veld, imbedded to a certain height in the soil, which is evident from the marks still left on the sides of the stones, showing that they formed a part of a boulder outcrop in the veld.

These outcrops occur in many places in the Transvaal, even within a few miles of Pretoria, not far distant from an old Bushman Cave; in the Transvaal the sculptures are, however, up to the present, only known from along the Vaal River, from Vereeniging downwards and from the Klerksdorp District.

None of these four engravings are worn away much, and in all of them the present colour of the designs attained by weathering is the same, viz., a fawnish grey colour.

This, and the still sharply defined, deep pointing, would seem to indicate that they have been made at about the same time, and their perfect workmanship to their being made if not by one man, by people with equal artistic talent.

The artist seems to have started by outlining the animal he wanted to represent by means of lines, produced by closely set punchings or pointings. This can plainly be seen from the picture of the Cape Ant-Eater (*Orycteropus capensis*) and the Guinea Fowl.



*Plate IX.*

**Bushman Stone, Gembuck.**





**Bushman Stone, Eland.**





*Plate XI,*

**Bushman Stone, Antbear.**





*Plate XII.*

**Bushman Stone, Guinea Fowl.**

In the case of the Ant-Eater, only the head, part of the neck, legs, tail and the underpart of the body are filled with rougher, deeper and more closely set pointings.

Each of these pointings has been produced by a single blow of the artist's primitive instrument, as is evident from the triangular shape of these pointings forming the margin of that part of the body which has already been sculptured out.

Plate 10 is the excellent reproduction of the Eland (*Oreas canna*), measuring 0·36 m.  $\times$  0·24 m.

Plate 9 is the Gemsbuck (*Oryx gazella*), measuring 0·34 m.  $\times$  0·23 m. Underneath its head is a head of another Gemsbuck, but upside down.

Plate 11 is the Cape Ant-Eater (*Orycteropus capensis*), measuring 0·26 m.  $\times$  0·15 m. On the photograph on the outside margin of the sculptured portion of its body the triangular pointings are distinctly visible.

Plate 12 is a Guinea Fowl (*Numida coronata*), measuring 0·19 m.  $\times$  0·14 m. Peringuey in his article "On Rock Engravings of Animals and the Human Figure, etc," referring to this photograph, writes "Or more probably the large Bustard or Gom Paw (*Otis kori*)," but the attitude, the curved back, short neck and the small conical process on the head of the bird shows undoubtedly that we have here a reproduction of the Guinea Fowl.

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## On a new species of *Rhinolophus* from Pondoland.

By LEWIS HENRY GOUGH, Ph.D.

Two skins of an apparently new species of *Rhinolophus* were found in a small collection of skins prepared by Mr. H. H. Swinny, Ngqeleni, District W. Pondoland, which I propose to describe under the name

### *Rhinolophus swinnyi*, n. sp.

Size very small, not as large as the smallest yet known South African species of the genus.

Posterior upper praemolar separated from the canine, which is very large, anterior praemolar very small, in the tooth row, towards its outer side.

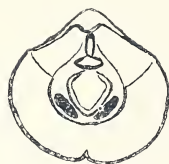


Fig. 1.

RHINOLOPHUS SWINNYI GOUGH.

Noseleaves, seen vertical to "horse-shoe,"  $\times 3$ . The hairs on the noseleaves have been left out.



Fig. 2.

RHINOLOPHUS SWINNYI GOUGH.

Noseleaves from side.  $\times 3$ . The hairs on the noseleaves have been left out.

Horizontal portion of sella narrow, upper margin of the posterior connecting process rising above the sella, forming a marked projection, rounded terminally; sides of the vertical process of the sella parallel above, summit truncated with rounded off sides. Antitragal notch very shallow.

Horse shoe large, circular, its anterior margin notched in the centre; lancet moderate, its sides strongly concave, covered posteriorly with fur similar to that on the rest of the head, anteriorly somewhat less dense. Ears of medium size, the under edge convex in the distal half, then concave, convex again proximally, the concave portion very short. Tip sharply pointed, upper half of the outer margin concave,



antitragal notch very shallow, lobe strongly convex. Hind limbs slender. Wings from the ankle. Interfemoral membrane finely fringed posteriorly.

Fur close and fine, about 7 mm. long on the back. General colour mouse grey, lighter below, individual hairs ash grey with brown tips. Membranes dark brown or black, interfemoral membrane with a fringe of greyish hairs.

*Dimensions of Type.*

Forearm, 40 mm. ; " head and body, 42 mm. ;" " tail, 18 mm. ;" " ear, 18 mm. ;" noseleaf, 10.5 by 6.5 ; lower leg and foot, 25 mm. ; " foot, 8 mm."

The measurements in inverted commas were taken in the flesh by the collector.

Skull : Greatest length, 17 mm. ; basal length to front of canines, 14.2 mm. ; breadth of braincase, 6 mm. ; front of upper canine to back of  $m^3$ , 6.4 mm. ; front of lower canine to back of  $m^3$ , 6.8 mm. ; from palatial notch to front of incisors, 5.8 mm. ; width from the outside of  $m_3$ , 6.5. Length of free portion of canine, 2.5 mm.

Type, adult male (dried skin), in the Transvaal Museum.

The co-type, also a male, is slightly larger ; forearm, 40.7 ; " head and body, 42 mm. ;" " tail, 19 mm. ;" " hindfoot, 8 mm. ;" " ear, 18 mm."



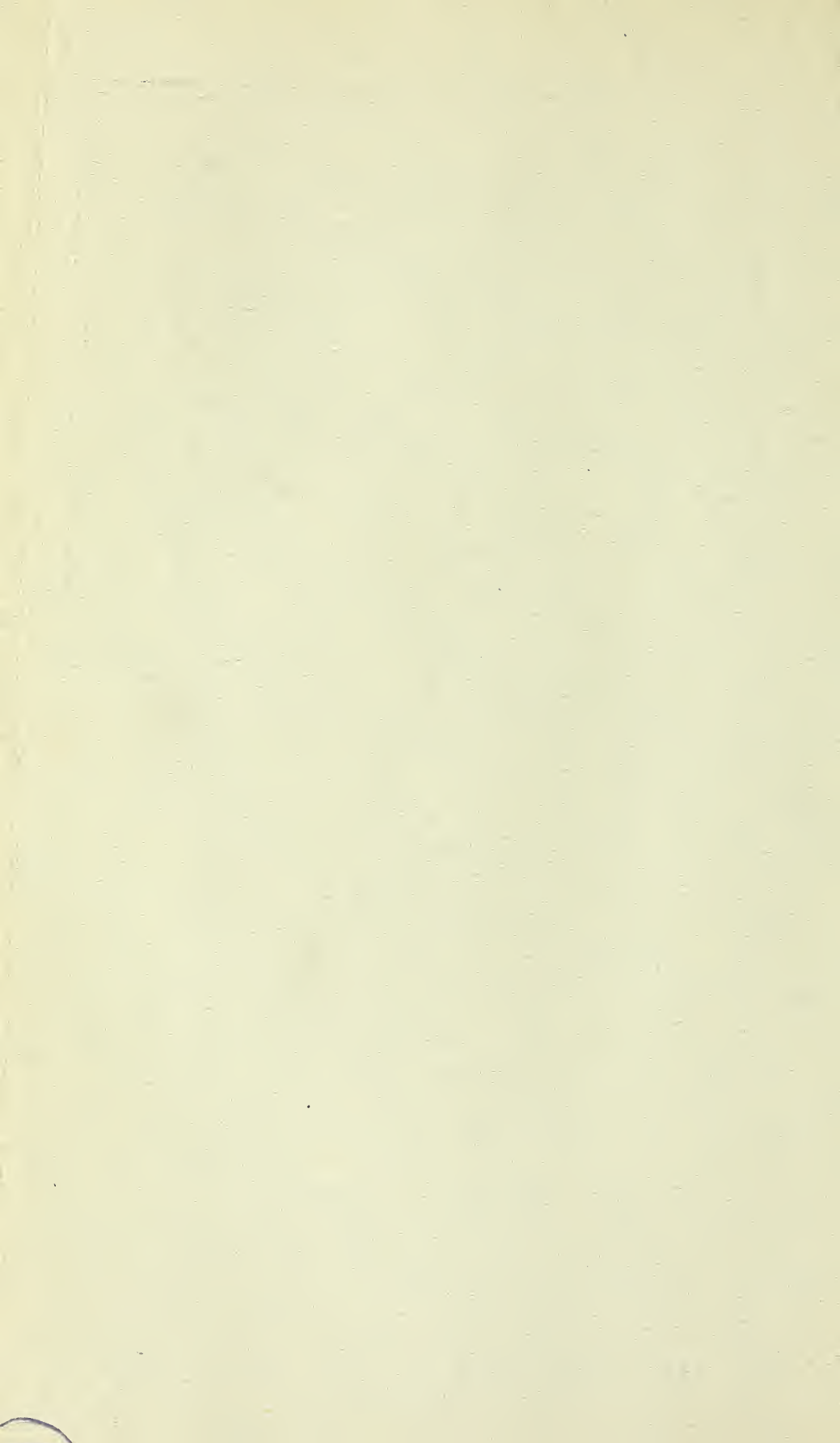
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# ANNALS

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### A LIST OF THE TICKS OF SOUTH AFRICA, With Descriptions and Keys to all the Forms known.

BY C. W. HOWARD,  
Government Entomologist for Mozambique.

There are probably none of the external parasites of domestic animals of more importance to the stock raiser in South Africa than the ticks, owing to the large number of diseases which they transmit from animal to animal. The ticks of South Africa have, however, only been studied with regard to their connection with the transmission of diseases, and very few people are aware of the distinction between the various species and the various forms of the same species.

With a view to throwing a little more light on these creatures, and mainly of assisting the work of those interested in the study of the diseases referred to, a study of the ticks of South Africa was taken up by me about three years ago while in the Transvaal. Since then a large number of the life histories of these ticks have been worked out, and their immature stages carefully studied and compared. There are still many species which I have not been able to see owing to the rareness with which they occur, but in such cases I have compiled the literature from other authors and placed it in such shape as I consider will prove useful to the South African workers. There is still an immense amount of work to be done on this subject, and my only plea for placing this paper before the public is in the hopes that it will arouse more interest in such studies, and consequently advance the work.

#### FAMILY IXODIDÆ.

The ticks or *Ixodidæ* are distinguishable from the other families of the order *Acarina* by the following characters :—

They are always large enough to be visible to the naked eye, flat when young, more or less swollen when fully engorged with blood ; the females almost always larger than the males, often attaining in certain species the size of a hazel nut. The integument is always coriaceous, and usually of a dull colour, such as brown or reddish-brown, but sometimes adorned with bright colours and designs.



The *rostrum* comprises (1) two *mandibles*, each formed of a shaft, the lower half of which is swollen to receive the insertion of muscles, while the upper half is flattened and narrow, terminated in front by a finger or digit, recurved in a hook at its tip. The base of the digit is wide and swollen; on its dorsal surface it bears two unequal apophyses, each with one or more processes and teeth, recurved, one of which is always terminal. These mandibles are wrapped throughout their full extent in a membranous sheath, a prolongation of which extends over the digit; (2) a *hypostome* shaped like a dart, armed on its lower face with backward projecting teeth placed symmetrically on each half; (3) two *palpi* composed of four articles each.

Respiration is by tracheal tubes opening to the exterior through two stigmata, surrounded by stigmatic plates, circular or lunate in outline, and situated near the fourth pair of coxae.

Legs with six articles (seven or eight by the apparent division of one or two articles into two parts); coxae immovable; tarsi provided with two claws, with or without a sucker-like disk called the *ambulacra*. The tarsus of the first pair bears on its dorsal edge, near the distal extremity, a cup-like depression, the organ of hearing known as "Haller's organ."

Larvae with six legs, without sexual orifice, and without large stigmatic plates; respiration takes place through one to four pairs of small openings along the lateral edges.

Nymphs with eight legs, and no sexual orifices; two large stigmatic plates present.

The members of the family live as parasites on mammals, birds, and land reptiles, the blood of which they suck by fixing their rostrum into the skin. The hypostome is provided with teeth, which, with the teeth of the mandibles, hold it in place. The palpi spread outward and apply themselves to the skin on each side, and at right angles to the point of piercing. The females leave the host to lay their eggs in some protected place on the ground, such as under a clod of earth, stones, or rubbish.

The family *Ixodidae* is sub-divided into two distinct groups or sub-families, the *Argasinae* or fowl ticks, and *tampans*, and the *Ixodinae* or true ticks.

A. Rostrum inferior, hidden under a frontal projection of the body; no anal plates; no pulvilli at tips of tarsi . . . . *Argasinae*.

AA. Rostrum terminal at anterior end of body; a dorsal shield present; tarsi with pulvilli . . . . . *Ixodinae*.

#### SUB-FAMILY ARGASINAE.

Rostrum inferior (except in the larvae, when it is often terminal, or nearly so, and in the nymphs, when it is sub-terminal, part of it projecting beyond the anterior end of the body), that is, the rostrum is situated on the ventral surface of the anterior end of the body, which projects over it like a hood. The digit of the mandibles is irregularly triangular, wide and swollen at the base; the inner apophysis is elongated, with the terminal tooth recurved outward, and the process more or less transverse, pointed at both extremities and inserted at about the middle of the length of the apophysis; the outer apophysis is elongate, provided on its outer edge with two large teeth, similar in form and almost parallel. The palpi are free, elongate, and cylindrical; the articles differing little from one another. The legs are a little unequal in length, the second pair is the shortest, the fourth pair the longest; six articles, the third and the tarsi

(except those of the first pair), show a false articulation at a distance from their proximal ends, equal to their diameters; the coxae are contiguous, or almost so; the tarsi are not provided with pulvilli. The integument is of a colour varying from dirty yellow to dark brown; there are no chitinous plates, either as dorsal shield or ventral or anal plates; the integument instead is adorned with pits, furrows, and sculptures of various forms. The stigmatic plates are situated between the last two pairs of legs, laterally and dorsally of the coxae. The sexual pore is ventral, median, transverse, and situated opposite the intervals between the first two pairs of legs; in the male the pore is narrow, almost as long as wide, and semi-lunate; in the female the pore is an elongate slit almost as wide as the rostrum, with its edges parallel; otherwise the two sexes are almost indistinguishable from each other, except that in general the males are considerably smaller than the females, and do not distend to such an extent after feeding. The nymphs are very similar to the adults, except in lacking the sexual openings.

The members of this family are parasitic on mammals, but especially on birds. There are two genera, *Argas*, the fowl and bird ticks, and *Ornithodoros*, the tampanas and sand ticks.

#### *Adults and Nymphs.*

- A. Body usually flat, and thin at the edges; no deep furrows on the ventral surface; no eyes . . . . . *Argas*.  
 AA. Body thick at the edges; ventral furrows present; eyes present or absent . . . . . *Ornithodoros*.

#### *Larvae.*

- A. Body thin; larvae active . . . . . *Argas*.  
 AA. Body thick and swollen; larvae not active, or only so for a short time, at least they never feed . . . . . *Ornithodoros*.

#### GENUS ARGAS, LATREILLE.

*Argas*, Latreille (1796).

*Rhynchoprion*, Hermann (1804).

*Argas*, Latreille (Neumann, 1896).

*Body* flat; general contour usually oval with rounded extremities, sometimes orbicular, the anterior extremity narrower than the posterior, widest behind the fourth pair of coxae. Anterior end of the body projects beyond the capitulum like a hood. Lateral edges thin or a little thickened. Integument without papillæ, but somewhat roughened by irregular zigzag wrinkles or folds, which are absent only at certain points, occupied by nearly circular pits; these are shallow, more or less numerous and scattered, the larger ones form radiating series on both dorsal and ventral surfaces, of which the median posterior row is longest. Eyes absent.

This genus includes the fowl tick and bat tick. They are easily recognised by their flattened bodies, which cause them to look not unlike bed-bugs. The edges of the body are very thin, and formed by a series of folds or rectangular plates. On both upper and lower surfaces there is a system of shallow shiny pits, with raised edges, grouped into lines radiating from a central point.

These ticks are nocturnal in their habits ; usually parasitic on birds, fowls, bats, and sometimes man, and are found in places frequented by these animals. They are admirably adapted to their life, for their thin bodies can easily be concealed in cracks about fowl-houses or under the bark of trees.

There are only a few species belonging to the genus, and they resemble each other very closely. Three species occur in South Africa, which can easily be separated by the following keys :—

*Adults.*

- A. Body almost circular in outline, as wide in front as behind. *vespertilionis.*
- AA. Body oval in outline, longer than wide, and narrower in front.
  - B. Edge of body formed of a border of rectangular plates. *persicus.*
  - BB. Edge of body formed of a series of irregular wrinkles. *transgariëpinus.*

*Nymphs.*

- A. Body almost circular in outline . . . . . *vespertilionis.*
- AA. Body oval in outline . . . *persicus*, and probably *transgariëpinus*.

*Larvae.*

- A. Body truncate in front . . . . . *vespertilionis.*
- AA. Body not truncate in front. *persicus*, and probably *transgariëpinus*.

ARGAS PERSICUS, FISCHER DE WALDHEIM.

*Argas persicus*, Fischer de Waldheim (1823).

*Argas persicus*, Laboulbène et Megnin (1882).

*Argas persicus*, Fischer de Waldheim (Neumann, 1896).

*Plate I*, figures *f*, *g*, *h*, *i*, *Plate II*, figures *c* to *n*.

*Adult.*—*Body* oval ; dull yellowish or reddish-brown, or often blueish-black in colour, varying in accordance with the amount of blood taken into the digestive apparatus. *Dorsal surface* (*II*, *c*) excavated, flat or convex, according to the state of engorgement ; on each surface a border formed of rectangular plates, in the centre of each of which is a circular pit containing a small spine ; numerous shiny pits on the dorsal surface, in the anterior quarter two large oval pits, rather close to the median line, diverging in front, surrounded by concentric folds, behind these two similar pits, a little further removed and on each side of these, three or four others forming a transverse semi-circular series, with the concavity posterior, behind these a similar semi-circular series, then several straight lines in the posterior half, radiating from a central point, and unequal in length, one of this series median, uninterrupted, extending from the border almost to the centre, five or six short rows on each side, of unequal lengths, some approaching nearer the centre than others ; numerous small pits are scattered here and there on the remainder of the dorsal surface, a row two or three deep inside the marginal border at

either extremity. Arrangement of the rows of pits on the *ventral surface* approximately the same as on the dorsal surface; the remainder of the integument formed of zigzag folds passing between and surrounding the pits. Stigmatic plates (*II, n*) semi-lunate, transverse, opposite Coxae IV. Anus a short distance posterior of the level of Coxae IV, elliptical, seven hairs on the edge of each valve. *Rostrum* (*II, b*) short, set in a pit near anterior end of the body, just anterior of first pair of Coxae; base rectangular, nearly as wide as long; mandibles (*II, l, m*) with process of inner apophysis tridentate, outer apophysis short, with three teeth, the anterior of which is small and subterminal; hypostome notched at its extremity, in the females (*II, k*), on each half, at the tips five to seven small teeth in two transverse lines, then four strong teeth, disposed two and two, and followed by three smaller teeth, below which is a series of teeth becoming smaller and smaller and in three, four, and then five longitudinal rows, which do not extend to the external border nor further than the middle of the length of the hypostome; in the male (*II, j*) eight small teeth at the tip, followed by six large teeth in twos, then three small teeth arranged irregularly, below which is a series of small blunt teeth as in the female; palpi elongate, the second article perceptibly cylindrical, on their ventral side a few small hairs, and on their dorsal side numerous long hairs with denticles on the convex edges of the hairs, these hairs a little more abundant on the first article than on the second, still less numerous on the third and very few on the fourth, the extremity of which is truncate and a little concave, and bears twelve to fourteen blunt, cylindrical spines; four long hairs at the base of the rostrum, two of which are near the insertion of the palpi. Sexual opening in female, long transversely and narrow, situated between Coxae I, in male half as long as in female, wider, and situated opposite first inter-coxal space. *Legs* with Coxae slightly striated, those of the first pair a little removed from those of the second, second article cylindrical, almost as wide as long; the others a little flat dorsoventrally; the third and fourth elongate, truncate, narrower at the distal extremity, the other two with parallel edges, the third longest, the three others of almost the same size; tarsi with the dorsal protuberance usually indicated by a basilar constriction; short hairs on all the articles except the coxae.

*Female* up to 10 mm. long by 6 mm. wide; very flat when young; of a thickness in the centre almost equal to the half of its width when it is engorged. The male may reach 5 mm. long by 3 mm. wide, with the same depressions as the female.

*Nymph* resembles the adult, but without the sexual orifice; anus wider than in larva, five to seven spines on each valve. Mandibles like those of adult; hypostome (*II, i*) with five to eight small teeth at tip on each half, then five large teeth, followed by a series of small blunt teeth, growing smaller posteriorly and in rows of three, then four.

*Larva* (*I, f*) (unengorged), oval in outline, broadly rounded behind and more narrowly rounded in front; 0.66 to 0.70 mm. long by 0.50 mm. wide; flattened, with marginal and central part of dorsal surface slightly raised; light yellowish or greyish in colour, becoming nearly translucent at the margin, from which colourless lines extend toward the centre; a lighter shield-shaped area on the dorsal surface over the rostrum; surface of body with fine parallel transverse and slightly undulating striae; no pits; edge of body with a marginal row of short folds; numerous large,



stout, translucent hairs on dorsal surface, more numerous anteriorly and near lateral margins, where some are set on the lateral edge, all projecting backwards. Anus at the posterior third of length, elliptical in outline, one very long, slender spine on each valve; six stout spines surrounding anus at short distance from it, otherwise no spines on ventral surface. *Rostrum* set in a slight pit with rim raised anteriorly and laterally; only the base covered by the body, remainder projecting beyond the anterior edge. Mandibles as in nymph; hypostome spatulate, rounded at tip, on each half nine small teeth at the tip in three transverse rows, then one transverse row of four teeth, followed by one or two rows of three teeth each, then two large teeth in each row to near the base of the hypostome; palpi free, cylindrical, curved downward, article I as wide as long, articles II and III longer than wide, article IV conical, numerous long translucent hairs on all the articles, those on articles II and III dentate, a tuft of terminal hairs on article IV. *Legs* stout; equal in length; numerous long hairs; coxae contiguous; tarsi very long, not so abruptly truncate at tip as in adult; claws long. (Engorged) length, 2 to 3 mm. by 1.5 to 2 mm. wide, dark blueish in colour, more oval in outline than when unengorged, and resembles nymph, except that it lacks the radiating rows of pits, having instead furrows which correspond to the rows of pits in nymphs and adults.

*Eggs* nearly spherical, 0.5 mm. long, surface smooth, colour at first bright yellowish brown, then dark chestnut brown.

*Hosts*.—Fowls, ducks, geese, turkeys, pigeons, secretary bird, ostrich, canary, and man.

*Habitat*.—All the north-east and north-west parts of Persia, Turkestan, Russia, Egypt, Algeria, Cape Colony, Orange River Colony, Transvaal, Mozambique (and probably all of South Africa), and Australia.

This tick is pre-eminently a pest of fowls, although found occasionally on the other birds and animals mentioned. There is scarcely a fowl-house in the Transvaal which is entirely free from it, and where fowls are allowed to roost in trees the bark of such trees will be found to conceal countless numbers. The nests of many of our wild birds are also often infested. In South Africa it does not, however, seem to be common close to the coast. The same fact has also been noted in Australia.

The larval ticks are easily transported from one place to another due to their habit of remaining on a fowl for five to seven days before becoming engorged and dropping off. Thereafter feeding takes place only at night, and lasts only for half an hour to two hours. Both sexes moult three times before becoming adult, and while adult, they may feed as many as six times. The males differ from the females only in size, being much smaller, and in having the genital pore wide, instead of a narrow elongate slit.

Adult ticks have been known to live in vacant fowl-houses as long as thirty-seven months without food, and still be capable of oviposition after a good feed, while larvae have been left without food for eight months, and still survived.

This *Argas* will probably be found to convey some diseases of fowls, but its greatest injury seems to be in causing loss of blood. In a badly

infested fowl-house this loss is often so great as to cause fowls to die in large numbers. Travellers in the Middle Ages frequently referred to this tick as causing sickness, and even death, to human beings in Persia. In fact it frequently became so numerous in houses in that country as to make it necessary for entire villages to move and construct new dwellings elsewhere.

ARGAS VESPERTILIONIS, LATREILLE.

*Carios vespertilionis*, Latreille (1796).

*Caris vespertilionis*, Latreille (1804).

*Argas fischeri*, Audouin (1827).

*Argas pipistrellæ*, Audouin (1832).

*Caris vespertilionis*, Gervais (1844).

*Caris elliptica*, Kolenati (1857).

*Caris longimana*, Kolenati (1857).

*Caris decussata*, Kolenati (1857).

*Caris inermis*, Kolenati (1857).

*Argas fischeri*, George (1876).

*Argas pipistrellæ*, Westwood (1877).

*Argas vespertilionis* (Latreille) (Neumann, 1896).

Plate I, figures *h* to *p*; Plate II, figures *p* to *w*.

*Female* (*I, m*).—*Body* nearly circular, often somewhat wider than long (9.5 mm. wide by 8.5 mm. long); posterior edge in some cases nearly straight; anterior edge terminating in a point and produced into a narrow hood covering the rostrum; colour dark greyish blue when fully engorged, when not it is yellowish brown, lighter about the edges; legs light brown; integument roughened with numerous papillae; on the margin a border of elongate, quadrangular plates each with a short hair (*I, o*); irregularly disposed, narrower anteriorly; numerous shiny pits on the dorsal surface near the anterior third, two pits far apart, in front of them another pair further apart and another pair still more anterior and further apart, two rows of small pits extending anteriorly between these large pits; from posterior pair of pits a V-shaped groove opening anteriorly and continued posteriorly by a single groove to posterior third; on each side of this single groove is a very large deep pit with a smaller one more anterior, a wide row, two or three deep, of shiny pits extending along inner edge of margin, and from this numerous rows of pits, alternately long and short, extending inwards as if radiating from the centre. *Ventral surface* with a pair of well marked genital grooves and a narrow marginal groove with pits in their depth; radiating rows of pits as on dorsal surface. Genital pore elongate transversely and narrow, opposite posterior margin of Coxæ I; anus just posterior to Coxæ IV, elliptical, no spines surrounding it, but six spines on the edge of each valve; stigmatic plates uniform, opposite Coxæ IV. *Rostrum* concealed under dorsal hood and set in a pit, into which it can be retracted; base rectangular, much larger than wide; hypostome, conical, a single row of sharp teeth extending along the lateral edges, increasing in size from anterior to posterior part; mandibles (*II, s*) very elongate and narrow, at least twice as long as those of male, process of inner apophysis lacking, outer apophysis bidentate; palpi very short, article I somewhat longer than

wide, other articles as long as wide, article IV conical; long hairs on outer and distal margins of all articles, terminal tuft of hairs on article IV. *Legs* slender and very long, pair IV longest; Coxae elongate, removed from median line, pairs II, III, and IV contiguous, pair I removed anteriorly; article I longer than wide, other articles all very long and slender; tarsi gradually attenuated at tips; all articles with numerous whitish hairs; claws very long and slender.

*Male (I, l).*—Resembles the female except for the following points: much smaller, 5.5 mm. wide by 5.5 mm. long; somewhat narrower in front than behind, but lacks the conical anterior prolongation of the female; integument with papillae not so strongly formed; a pair of large pits on the dorsal surface on each side of the median line at about the anterior third of the length, in front of these another pair of pits, further removed from the median line, with a third pair still further anteriorly and more widely separated, behind the first-mentioned pair another pair of pits, more widely separated; numerous radiating rows of pits as in female; anus with eight long spines on each valve, close to the anal ring; genital pore short transversely, opposite Coxae I; deep coxal grooves; mandibles (*II, r*) short and thick, process of outer apophysis bidentate and attached low down, outer apophysis bidentate; hypostome (*II, v*) with three rows of small teeth on each side at tip, first row consisting of two teeth, other rows of four teeth each, then a row of three larger teeth, followed by a row of two very large teeth each. *Legs* shorter and stouter than in female; pairs I and IV longest; Coxae contiguous; article I as wide as long or about so; other articles much longer than wide; claws of tarsi shorter than those of female.

*Nymph (I, n).*—Body almost circular, may reach 2.4 mm. long by 2.1 mm. wide, narrowly rounded anteriorly, which acts as a hood in covering the rostrum. Integument marked with fine zigzag folds on young individuals, but with papillae on those which are older; on each surface a border, formed of irregular folds on young individuals, elongate quadrangular plates on those more mature, narrower anteriorly, plates bearing very short hairs, irregularly disposed. Arrangement of pits on dorsal and ventral surface as in the male; other characters like those of male except as follows: anus with five spines on each valve; deep transverse groove immediately posterior to the anus; the extremities of the rostrum often appear beyond the anterior edge of the body; process of inner apophysis and outer apophysis inserted very anteriorly, otherwise resembles those of the male; hypostome (*II, u*) provided on each half with two longitudinal rows of five or six strong teeth each; two long hairs at the base of the rostrum, near the median line, two others shorter, more posterior, and more widely separated, on the prolonged axes of the palpi.

*Larva.*—*Body* short, oval, truncate in front; 1.3 to 2 mm. long by 1 to 1.5 mm. wide; colour varying from light dirty yellow to reddish, deeper in centre, bluish when engorged; legs lighter in colour; flat, with the margin and the centre of the dorsal surface raised; ten radiating grooves in the posterior half of the dorsal surface and a somewhat larger number in the corresponding part of the ventral surface. *Integument* marked with fine folds, parallel, transverse, a little undulating. On each side of the *dorsal surface* three hairs, distributed symmetrically in the anterior half; twenty



hairs, distributed on the circumference, four at the truncated anterior end, two pairs of sternal hairs; seven hairs around and at a certain distance from the anal ring; a strong hair on the anterior edge of each anal valve. *Rostrum* elongate; only its base covered by border of the body; the rest projecting anteriorly beyond the body; mandibles similar to those of the nymph, but the inner apophysis inserted lower down, near the middle of the digit, as in the male; hypostome (*II*, *t*) narrow, long, pointed at the extremity, armed on each half near the tip with four longitudinal rows of teeth, the inner rows composed of weak, the outer rows of strong and sharp teeth, below these two rows of large teeth one of which is marginal and formed of ten to twelve teeth, extending to the base of the hypostome; palpi slender and free; the first article a little longer than wide, the other three twice as long as wide, the fourth small, cylindrical, with four or five terminal spines; the second and third with four dentate hairs on their external borders; four short hairs on the base of the rostrum and placed as those on the nymph. *Legs* almost equal in length; Coxae almost contiguous, very far from the median line, elongate; second article as long as wide; the other four cylindrical; the tarsi longest, similar to those of the nymph; the hairs semi-denticulate, on all the articles.

*Hosts*.—Bats: *Miniopterus schreibersi*, (Pretoria), *Vesperugo pipistrellus*, *Plecotus auritus*, *Vesperugo kühli*, *V. noctula*, *Myotis murinus*, *Rhinolophus clivosus*, *R. hippocreptis*, *Brachyotus dassyne-mus*, *Synotis barbactellus*; Man.

*Habitat*.—England, France, Egypt, Tunis, Cape Colony, Transvaal. As this tick occurs in Egypt and also in South Africa the probability is that it will be found in other parts of Africa also.

This tick is not often seen, probably because the hiding places of bats are seldom searched for them. I feel sure, however, that they are very common throughout South Africa, and natives have told me that they have found them under bark of trees in the bush.

Out of several hundreds of specimens which I have collected I have found only one adult female. The life history seems to be very much like that of *A. persicus*; larval ticks can be found in numbers, in all stages of engorgement on bats. When a house becomes a hiding place for bats, these ticks may become so numerous as to cause considerable annoyance to the occupiers, for to those sensitive to insect bites, the bites of these ticks cause considerable pain and swelling of the portions of the body bitten. In Tunis it has been found that this species may transmit a spirillum of bats.

#### ARGAS TRANSGARIEPINUS, WHITE.

*Argas transgariëpinus*, White (1846).

*Argas kochi*, Neumann (1901).

*Argas transgariëpinus*, White (Neumann, 1906).

*Male*.—*Body* flat, thin, in a wide oval, almost as wide in front as behind; length 7.5 mm., width 6 mm.; brownish red, legs and rostrum lighter. *Dorsal surface* convex, excavated along the edge, which is raised; integument finely chagreened. On each surface a



relatively large border (0.3 mm.) formed of irregular radiating wrinkles. On the dorsal surface numerous shiny pits, forming radiating lines in the posterior third of the surface, at the anterior quarter of the length two large oval pits close to the median line, about them an interrupted circle of small pits, outside this circle in nearly all of the anterior quarter, up to the margin, numerous, unequal irregular pits, mostly small and continued behind by two or three rows within the margin. Ventral surface a little concave, with shiny pits not very apparent; anus about the middle of the length, opposite the stigmatic plates, which are scarcely its diameter; sexual orifice very small, opposite the posterior extremity of coxae I. *Rostrum* very small (0.5 mm.), very near the anterior edge, and removed from coxae I; its base longer (0.5 mm.) than wide, lodged in a cavity; hypostome narrow; palpi short. *Legs* short; lines of the coxae distant from each other, enclosing between them about one-third of the width; coxae I distant from coxae II; tarsi I with a very large prominence near their extremity, the others terminating in a feather edge, with the dorsal, sub-terminal prominence almost obsolete.

*Hosts*.—Probably fowls and birds.

*Habitat*.—South Africa (probably north of the Orange River); Basutoland.

I have never seen specimens of this species, and the description is, therefore, taken from that of Neumann. Professor Neumann has recently noted that his *A. kochi* differs slightly from *A. transgariepinus*, in having the prominences on all of the tarsi, instead of only on tarsi I, as in *transgariepinus*, although not quite as prominent as on tarsi I, of this latter species. If this proves to hold true for both sexes, *A. kochi* will become a variety and not a synonym of *A. transgariepinus*.

#### GENUS ORNITHODOROS, KOCH.

*Ornithodoros*, Koch (1844).

*Ornithodoros*, Koch (Neumann, 1896).

*Body* sometimes oval; generally with lateral margins straight and parallel, or almost so, sometimes concave; prolonged in front in an angle more or less marked from the point of insertion of the second pair of legs; rounded on the posterior margin. Hood recurved on the ventral surface, where it is hollowed out in a pit for the insertion of the rostrum with thick edges. Edge of the body thick, with the two surfaces not differentiated. Integument with prominent hemispherical papillae arranged in various designs; the dorsal surface bears various depressions; on the ventral surface folds and grooves constant; two longitudinal folds known as *coxal folds*, similar, prominent, situated opposite the inner extremities of the coxae, and disappearing behind the last pair of coxae; two similar longitudinal folds, known as *sub-coxal folds*, situated above and outside of the coxae; a transverse *pre-anal groove*; another transverse *post-anal groove*; a longitudinal groove known as *anal groove* extending from the anus to the post-anal groove; eyes sometimes present.

Four representatives of this genus are reported from South Africa, only one of which is found in the Transvaal, *O. savignyi caecus*. *O. savignyi pavimentosus* is found in German South-West Africa, where *caecus* is also supposed to exist. *O. talaje capensis* is limited in its distribution, being confined to the islands off the west coast of Cape Colony where penguins are abundant.

The four varieties may be separated by the following key:—

*Adults and Nymphs.*

A. Body short, oval; widely rounded at both extremities; several teeth upon tarsi and article V of legs. Rostrum without prominent lateral cheeks to form a partial hood for it.

B. Eyes present.

C. Teeth upon tarsi and article V of legs, well separated, higher than wide and rounded ... .. *savignyi*.

CC. Teeth upon tarsi and article V of legs, closer together, wider than high and more quadrilateral in outline ... .. *savignyi pavimentosus*.

BB. Eyes absent; teeth on coxae as in *savignyi* *savignyi caecus*.

AA. Body elongate and narrow, pointed on the anterior end; rostrum with prominent lateral cheeks, which partially cover it; no teeth upon coxae or article V of legs *talaje capensis*.

*Larvae* (only known of two species).

A. Length 1.66 mm.; width 1.3 mm. ... .. *savignyi caecus*.

AA. Length 1 to 1.5 mm.; width 0.75 to 1 mm. *savignyi pavimentosus*.

*Eggs.*

A. Eggs of a reddish brown colour—0.9 mm. by 0.8 mm. *savignyi caecus*.

AA. Eggs of a darker colour—1.4 mm. by 1.0 mm. *savignyi pavimentosus*.

ORNITHODOROS SAVIGNYI, (AUDOUIN.)

*Argas savignyi*, Audouin (1827).

*Ornithodoros savignyi*, Koch (1844).

*Ornithodoros morbillosus*, Gerstäcker (1873).

*Argas monbata*, Murray (1877).

*Argas schinzii*, Berlese (1889).

*Ornithodoros savignyi* (Audouin) (Neumann, 1896).

*Adults*.—*Body* a short oval in outline, widely rounded at both extremities, sometimes a little constricted at the sides, at the plain of the third and fourth pairs of legs; colour ochreous yellow when young, darker and even brownish black when adult, the legs of a lighter colour; *integument* covered with granulations varying with the size of the creature itself; hairs abundant, placed between the

granulations, more numerous on the ventral than on the dorsal surface, most numerous in the region of the rostrum, more numerous on individuals of medium size than on young or engorged females. On the *dorsal surface* a median prominence limited behind by a transverse groove near the posterior quarter of the length, and crossed in its middle by a constricted pit. Seven (7) similar pits, of which one is median and situated in the anterior extremity of the prominence, are distributed in front, at a certain distance from the anterior edge. From each of these paired pits a groove extends backward, the inner one joining the anterior part of the median prominence, the two middle ones on the sides and the two outer ones limiting the median prominence laterally and joining the transverse groove, behind which they pass, and behind which they are recurved. Another transverse groove behind at a little distance from the posterior margin. On the *ventral surface* a transverse groove with the concavity behind, situated immediately in front of the anus, known as the pre-anal groove, which unites with the sub-coxal groove. Behind the pre-anal groove, six longitudinal grooves, especially apparent in the large individuals, symmetrical, three on each side, the middle ones longer, curved inward, and meeting the anus in front by a short median groove which joins their anterior by two branches like an inverted Y. Coxal folds not very prominent; sub-coxal folds well marked, the folds and grooves which limit them stopping at the pre-anal groove. *Stigmatic plates* at the sides and above the coxal folds, opposite the third inter-coxal space, just anterior of the lateral constriction, semi-lunate in outline. Anus wider than long. Four oculiform points (eyes), two on each side, situated on the sub-coxal fold, opposite the first pair of coxae, the second opposite the second inter-coxal space and consisting of a hemispherical shining organ. *Integument* thick, with granulations consisting of irregularly hemispherical prominences, very thin on the summits, thick on the outer parts; plaited and crenulated about their bases; between them, in the narrow depressions, wrinkles or small polygonal meshes. In the large depressions or grooves, on the dorsal surface and on the ventral surface, the granulations are replaced by small oval pits, each one divided into a larger number of small polygonal and contiguous areas. *Rostrum* strong, base short and rectangular, wider than long, sides slightly convex, more or less sunken in a deep pit, with slightly raised edges; mandibles elongate, inner apophysis of digit in the form of a simple claw, inserted a little below the middle; outer apophysis bidentate, with the basal tooth placed opposite the inner apophysis, the upper tooth recurved, with a short point; sheath a little spinous in its anterior part, simply striated the remainder of its extent; hypostome short, wide at its base, rounded or notched at its extremity; teeth forming three irregular longitudinal series; the outer row stronger; on the inside two or three series of teeth becoming shorter and shorter, beginning only in the middle or posterior quarter of the hypostome and extending backward to the same distance as the preceding, each row comprising only five to eight small teeth, decreasing in size; two hairs at the base of the hypostome; palpi elongate and narrow, articles plainly cylindrical, of a diameter diminishing rapidly from first to fourth. On all the surfaces of each article some stout hairs very unequal in length, with blunt or swollen tips, the last article rounded at its tip, which is naked, without spines. *Legs* strong, the fourth pair one and a half times as long as the first;

coxae contiguous, decreasing in size from the first to the fourth pair, striated on the ventral surface, granular on the dorsal and posterior surfaces, with a transverse granular pad at the distal extremity; the second article wider than long in the first two pairs of legs, longer than wide in the other two pairs; dentate on distal edge, with a distal granular pad; third article wider at the distal extremity; fourth article short in the first three pairs of legs, twice as long in the fourth pair; fifth article provided on its dorsal border, in the first three pairs, with three successive teeth, the two proximal quadrangular, the distal conical; on the fourth pair only two conical teeth; tarsi provided on their dorsal border with three teeth, one basal (on the proximal pseudo-article of the last three pairs of legs), the second close to the first (both quadrangular), the third conical near the distal extremity; swollen or blunt hairs fairly numerous, and a few spines on all the articles except the coxae.

*Hosts*.—Man, goats, sheep, and other mammals.

*Habitat*.—Somaliland, Kilimanjaro, Congo, Egypt, South-East Africa, India. It is also said to occur in German South-West Africa. It is usually found in loose soil in the shade of trees and rocks in desert tracts, places chosen by animals for rest.

There has been considerable confusion between this tick, its variety *caecus*, and *O. moubata*. I have seen only specimens of *O. savignyi caecus*, but after a careful study of the published descriptions and illustrations of the other two, I have come to the conclusion that if *moubata* can be considered as separate from *savignyi*, it must be only as a variety of the latter species. The main difference between these two seems to be that *moubata* lacks the eye spots, which are present in *savignyi*, and that the inner apophysis of the mandibles are *bidentate*, while in *savignyi* they are *uni-dentate*. *Moubata* cannot be considered as identical with *savignyi caecus*, although both forms lack eyes, because *caecus* agrees with *savignyi* in having the inner apophysis of the mandibles *uni-dentate*. The form of the last two articles of the legs of these three forms, which is a character considered in other species, seems to differ in no essential detail.

A study of the life history of *moubata* and *caecus* shows that they agree in all but one point. Dutton and Todd (1905) state that the larva of *moubata* sheds the egg-shell and moults to the nymphal octopod stage at the same time. Such is not the case with *caecus*. The larva hatches as a true larva with six legs. It crawls about for a short time, but does not feed; then it becomes motionless, the outer skin dries, and, after a time, the octopod nymph emerges.

Taking all these points into consideration, it seems that we must consider these three forms as distinct, but the differences do not seem to me to be of importance enough to consider them as distinct species. My opinion is that both *caecus* and *moubata* are merely varieties of *savignyi*, and should be known as *O. savignyi caecus* and *O. savignyi moubata*.



ORNITHODOROS SAVIGNYI, var. CAECUS, (NEUMANN.)

*O. savignyi* (Audouin), var. *coecus*, Neumann (1901).

Plate I, figures *a* to *e*; Plate III, figures *g*, *h*.

This variety differs from the type in the following points: The body is generally more swollen; the eyes are absent.

The *females* are 9 to 11.5 mm. long by 6.5 to 8.5 mm. wide; *males*, 8.5 to 9 mm. long by 6.5 to 7 mm. wide. The genital opening of the female is long and narrow, opposite the posterior edge of coxae I, that of the male is short and wide, and opposite coxae II.

*Nymph* resembles the adult in all respects regarding shape, integument, and grooves. The colour is light yellow when first transformed from the larva; later, deep bluish after feeding; legs translucent; length when first transformed 1 to 1.5 mm., width 0.75 to 1 mm. Genital pore lacking. *Rostrum*, as in adult, projects somewhat beyond anterior edge of body. Mandibles as in male and female; hypostome (*II, f*) in young nymph bears five transverse rows of two teeth each on each half, with numerous crenulations, posterior teeth extending furthest along the outer margin. Stigmata as in adult; anus circular, one large spine on each valve near its anterior end. *Legs* as in adult.

*Larva*.—When first hatched, nearly circular in outline, sides slightly depressed and parallel, 1 mm. long and half as thick as long; later, it expands slightly, becomes thinner, and, when ready to transform to nymph, is 1 to 1.5 mm. long by 0.75 to 1 mm. wide. Colour light brownish yellow; legs translucent. Integument without papillae, but possessing fine transverse striations; no grooves and no hairs; sexual groove lacking. *Rostrum* projects beyond anterior edge nearly its whole length; mandibles often cannot be made out plainly, but bear same characters as adults; hypostome (*II, e*) small, deeply divided at tip, small denticles at tip, then four rows of teeth, four teeth each to inner rows, but only three teeth in outer rows; two large spines at base. Palpi thick, cylindrical; articles all short and thick, a few stout spines near distal portions of articles. No indications of stigmata. Anus always concealed by a mass of white secretions in rectum. *Legs* stout; no tubercles present as in adults. Becomes whitish before moulting time.

*Eggs* nearly spherical in shape, 0.9 mm. long by 0.8 mm. wide; dark reddish brown in colour; surface smooth and shiny.

*Hosts*.—Man, fowls, sheep, goats, cattle, and other animals.

*Habitat*.—Eastern Africa, including German East Africa, Mozambique, Angola, German South-West Africa, Upper Zambesi, Congo, Transvaal, Natal, Cape Colony, Nubia, Abyssinia, Egypt, Southern Basin of Lake Tchad. Besides being found in sand in desert-like places, it is very common in native huts, where it attacks the inhabitants.

This tick was originally given the name of *Tampan* by Livingstone, being the name employed by certain native tribes along the Zambesi. In Sesuto it is known as *Makarulu*. It occurs in the warmer parts of the Transvaal, where it often becomes a serious nuisance at outspans and in native huts, and occasionally in houses of whites. The life history is much like that of *Argas persicus*, i.e.

short feeding spells alternating with long rests of weeks or maybe months. Several molts are passed as nymphs, and when mature the female alternates feeding with egg-laying. The larval stage, however, never feeds, and does not move about much, but enters into a quiescent state soon after hatching, from which it emerges as an eight-legged nymph. This tick probably transmits human tick-fever in the Northern Transvaal and Moçambique in the same way as its relative *O. moubata* of the Congo.

ORNITHODOROS SAVIGNYI, var. PAVIMENTOSUS,  
NEUMANN.

*O. pavimentosus.* Neumann (1901).

Plate III, figures *f*, *g*, *h*.

This variety differs from the type in the following respects: body more swollen, colour of a more ochreous brown, even when fully engorged; legs (*III*, *g*) shorter than in *savignyi*; same number of teeth on the dorsal margin of article V and tarsi (*III*, *f*), but these teeth are stronger, and almost contiguous on legs I, II, and III.

*Females* are from 14 to 17 mm. long by 11 to 12 mm. wide.

*Males*.—Similar to females; 6 to 8 mm. long by 4.5 to 7 mm. wide.

*Nymphs*.—Resemble adults; *rostrum* as in *caecus*.

*Larvae* resemble those of *caecus*, only larger; length 1.66 mm., width 1.3 mm. The inner apophysis of the mandible is simple, and inserted lower down; the outer apophysis is bidentate; hypostome with four rows of teeth.

*Eggs*.—Larger than in *caecus*, darker coloured, nearly black, surface shiny; 1.4 mm. long by 1.0 mm. wide.

*Hosts*.—Man and other animals.

*Habitat*.—German South-West Africa. It hides in the sand as *O. savignyi* does.

This form was described by Neumann from a single female collected at Bethany, in Great Namaqualand. I have received a large number of specimens from German South-West Africa in all stages of development, and have also been able to work out the earlier stages of the life history. The life history resembles that of *caecus* in main, but it differs from *savignyi* in being somewhat more swollen, and in the characters of articles V and tarsi, but in no essential details. From *moubata* it differs in the characters of the legs, and in possessing eyes, as in the type. From *caecus* it is distinguished by its larger size, more brownish colour, presence of eyes, and the characters of the legs. The early stages of the life history are like those of *caecus* rather than *moubata*, i.e. the larva hatches, then becomes quiescent, and in a short time sheds its skin, and the octopod form emerges.

It does not seem to me that there are sufficient grounds for making this a separate species; it is, however, distinct from the type, and I have made it a variety, i.e. *savignyi pavementosus*.

## ORNITHODOROS TALAJE, var. CAPENSIS, NEUMANN.

*O. talajé* (Guérin-Ménéville), var. *capensis*. Neumann.Plate I, figures *r*, *s*; Plate III, figures *a* to *e*.

*Adult*.—*Body* elongate and narrow with lateral borders, straight or almost straight, parallel, contracted at the anterior extremity into a rounded point, almost straight or slightly convex on the posterior border and joined to the lateral borders by rounded angles; dirty yellow when young, brownish to bluish black when replete. *Dorsal surface* (III, *a*) margined by a wide raised border (not so prominent when fully engorged), similar to the rest of the integument, and forming on the anterior end a deep median V-shaped fold; the remainder of the dorsal surface excavated or undulating, with usually an anterior elevation, corresponding to the rostrum; on this elevation, four smooth symmetrical depressions, numerous depressions within the marginal border, surrounding this elevation in a circle. In the posterior half a median line of smooth depressions extending from posterior border anteriorly about one-quarter of the length of the body. A short distance from the anterior end of this median line is a single large depression, with two large depressions on each side of it, near the lateral margins; extending posteriorly from the two posterior of these depressions is a line of pits, similar to the median, but curved inward, and close to and following the lateral margin. On the *ventral surface* (III, *b*) a pre-anal groove not very deep, almost straight, ceasing at the coxal folds; a post-anal groove composed of a transverse fold, straight, or a little curved anteriorly or posteriorly, very near the posterior border, a large circular depression at each extremity; an anal groove, ceasing at the post-anal groove, its depth occupied by smooth depressions resembling those on the dorsal surface; sub-coxal and coxal folds well marked, the sub-coxal ceasing at the coxal grooves which pass anteriorly between the coxae of the first and the second pair of legs, which they separate; posteriorly they extend behind coxae IV toward the lateral margin. *Stigmata* on the dorsal surface of the sub-coxal folds, the stigmal opening almost longitudinal, semi-lunate. *Anal ring* almost as wide as long, anal opening provided with two or four spines on each valve. *Genital pore* opposite posterior margin of coxae I; female pore long and narrow, that of male short and wide. No eyes, but two swellings on margin above legs I and II without any eye-like spots. *Integument* thin, with hemispherical granulations, shining, contiguous, almost equal in size, forming by their uniformity a network of meshes limited by folds, the centres of which bear one to four very short claviform hairs, with wide bases. *Rostrum* elongate lodged in a deep cavity, with lateral borders very well developed in the form of cheeks like an inverted V-shaped hood, which can fall down and protect it; base of rostrum wider than long, with sides convex, and several long hairs near lateral margins; set on a narrow base, the integument of which is finely honeycombed and wrinkled crosswise, this base allows the rostrum to be inclined forward and to be retracted; *mandibles* (III, *c*) with digit large and thick, inner apophysis close to the base, as wide as long, provided with three equal teeth pointing backward, outer apophysis tridentate, with posterior tooth stronger, provided at its base with an additional denticle, anterior tooth very small;



hypostome (*III*, *c*, *d*) indented at tip, provided on each side with two rows of teeth which occupy only the anterior half of the organ; numerous small teeth at tip, and in the case of the male several small teeth between large teeth and median line, crenulations or small teeth below large teeth; two hairs at its base. *Palpi*, with the first article longer than wide, bordered inside with a narrow flange, finely chagreened on the dorsal surface; the other articles as wide as long, smooth, numerous long pectinate hairs on all the articles, several short spines terminal on the fourth article. *Legs* long and slender; *coxae* sub-triangular, contiguous, covered on their posterior half with granulations similar to those of the rest of the body; the rest of the surface of the coxae presents very fine granulations, which are found on all the extent of the other articles; coxae I with a blunt tooth on the posterior median angle; second article cylindrical, as wide as long in the second and third pairs, longer in the first and fourth; the third, fourth, and fifth articles scarcely wider at the distal extremity; *tarsi* wider at the base than at the free end; no pre-ungual groove marked, except on the first pair; no teeth on article V and *tarsi* as in *O. savignyi caecus*. Hairs roughened or semi-pinnate on all the articles, more abundant and longer in the *tarsi*.

Length of female, 5 to 6 mm.; width, 3 to 3.5 mm.

Length of male, 3.5 to 5 mm.; width, 2 to 3 mm.

*Hosts*.—Penguins, fowls, (experimentally also man).

*Habitat*.—So far as is known, this variety is found mostly in the nests of penguins on the islands off the western coast of Cape Colony, where it is very abundant. It has also been reported from Tristan de Cunha.

This variety differs from *talaje* by the lesser development of the cheeks which cover the rostrum. In the species they almost completely conceal the mouth parts, but in *capensis* they furnish only an incomplete protection at the sides, and do not reach so far as the posterior edges of the base of the rostrum. The hairs are also more abundant and longer on the movable articles of the legs than is the case with *talaje*.

I have only seen a few preserved specimens of males and females of this variety, and have never been able to secure live specimens for rearing. Lounsbury records that they seem to alternate long periods of rest with short visits to the host for feeding. He also says that a favourite joke among the labourers of the Guano Islands, off the Cape Coast, is to place these ticks in the beds of new-comers.

#### SUB-FAMILY IXODINAE.

This sub-family is characterised as follows:—

*Rostrum* terminal; digit of mandibles provided with two apophyses, inner apophysis generally short, terminated by one to four points equal or unequal; the outer apophysis elongate, parallel or straight, divided on its free border into two to four or five successive teeth, which increases in size from anterior to posterior; palpi free, with four articles, the two middle ones of which are excavated on the inner surface, the fourth very short and in the form of a tactile appendage, being lodged in a sub-terminal pit of the third. *Legs* slightly unequal; those of the second pair the shortest, the fourth pair



longest; with six (8) articles, the third and the tarsi presenting a false articulation near the proximal end, except in the tarsi of the first pair, where it is near the distal end; tarsi provided with a cup-like ambulacre, produced from a caruncle, folded more or less fan-like on the ventral surface of the claws. *Integument* coriaceous, extensible, reinforced by a dorsal shield, emarginated to receive the base of the rostrum, often ornamented with designs and bright colour, grooved in front by two longitudinal grooves (cervical grooves), starting from the angles of emargination at base of rostrum. *Stigmatic plates* situated behind the coxae of the fourth pair of legs. *Sexual opening* median transverse, placed more or less in front, between the coxae of the first three pair of legs; from the commissures of that orifice start two grooves (*sexual grooves*), which extend backwards and diverge more or less, terminating at a variable distance from the posterior margin. Sexual dimorphism very marked; the male is ordinarily smaller than the female, more flattened and often of a less regular oval contour; the anterior extremity being much more narrow than the posterior; the dorsal shield covers all the body or leaves uncovered only a marginal band; the posterior border is usually divided into eleven quadrangular festoons, extending between the dorsal extremities of the two stigmatic plates, and often prolonged on to the ventral surface; the ventral surface often presents shields and plates, the number and form of which are variable. The *female* is flat at first, but from the development of the enormous quantity of eggs, can become of a considerable volume by the extension of its integument in the three dimensions; the dorsal shield is limited to the anterior part and preserves its original dimensions during distention of the body; the posterior portion of the abdomen often presents (in the young) eleven festoons. The dorsal surface of the base of the rostrum has two symmetrical pits (porose areas), with very fine punctuations, which are lacking in males, nymphs, and larvae.

This sub-family is divided into three tribes—the *Ixodeae*, *Rhipicephaleae*, and the *Amblyomeae*.

*Ixodeae*.—Males clothed on all their ventral surface with shields. Anal furrow of both sexes passing around anus in front, and separate from the genital furrows; no eyes. Rostrum elongate. Includes the genus *Ixodes*.

*Rhipicephaleae*.—Males provided with one pair of anal shields, ordinarily accompanied by accessory shields. Anal furrow of both sexes passing around the anus behind, and usually joining the genital furrows in front. Eyes present. Rostrum sometimes long and sometimes short. Includes the genera *Rhipicephalus*, *Margaropus*, and *Hyalomma*.

*Amblyomeae*.—Males without anal shields. The anal furrow surrounding the anus behind and usually joining the genital furrows in front. Sometimes with eyes. Rostrum long or short. Includes the genera *Amblyomma*, *Aponomma*, *Neumaniella*, *Rhipicentor*, *Dermacentor*, and *Haemaphysalis*.

The various genera of this sub-family may be separated by the following key:—

*Adults.*

- A. Males clothed on all their ventral surface with shields; anal furrow of both sexes passing around anus in front, and not joined to the genital furrows ... .. (*Ixodeae*), *Ixodes*.

AA. Males with small anal plates or without, but ventral surface *not covered* with plates; anal furrow passing behind anus and usually joining genital furrows, or wanting.

B. Males with two anal plates, usually accompanied by an accessory pair, eyes present ... (*Rhipicephaleae*.)

C. Rostrum long; palpi elongate and valvate

*Hyalomma*.

CC. Rostrum short; palpi short, broad, with an outward projection on the second article.

D. Anal groove present, stigmatic plates comma-shaped in both sexes ... (*Rhipicephalus*.)

DD. Anal groove absent; stigmatic plates circular or oval ... (*Margaropus*.)

BB. Males with no ventral plates; eyes sometimes present

(*Amblyommeae*.)

C. Eyes present.

D. Palpi long, valvate; coxae IV not longer in male than coxae I to III; stigmata triangular

*Amblyomma*.

DD. Palpi short, thick; coxae IV much larger in male than coxae I to III; stigmata comma-shaped, short.

E. Palpi very short and wider than long; coxae IV with two long spines ... (*Rhipicentor*.)

EE. Palpi longer than wide; coxae IV without long spines ... (*Dermacentor*.)

CC. Eyes absent.

D. Palpi long; stigmatic plates comma-shaped.

E. Body as long as wide; anal groove present

*Aponomma*.

EE. Body wider than long; anal groove not present ... (*Neumaniella*.)

DD. Palpi with a sharp projection outward; stigmatic plates circular or short comma-shaped

*Haemaphysalis*.

*Nymphs*.

(Key based on known Transvaal forms.)

A. Anal groove surrounds the anus in front opening posteriorly.

*Ixodes*.

AA. Anal groove surrounds the anus behind opening in front.

B. Palpi produced into a prominent lateral point.

*Haemaphysalis*.

BB. Palpi more or less cylindrical.

C. Body circular in outline; as wide as long

*Aponomma*.

CC. Body longer than wide.

D. Body narrower behind than in front

*Margaropus*.

DD. Body as wide or wider behind than in front.

E. Shield pentagonal in outline; antero-lateral edges occupying three-quarters of the length of the shield

*Rhipicephalus*.

*EE.* Shield cordiform in outline.

*F.* Eyes hemispherical ... *Hyalomma.*

*FF.* Eyes flat ... *Amblyomma.*

*Larva.*

(Key based on known Transvaal forms.)

*A.* Body much longer than wide; narrowed at both extremities.

*Ixodes.*

*AA.* Body as long as wide, or longer than wide, but widely rounded behind.

*B.* Palpi produced into prominent lateral points.

*Haemaphysalis.*

*BB.* Palpi more or less cylindrical.

*C.* Body as wide as long; circular in outline

*Aponomma.*

*CC.* Body longer than wide.

*D.* Palpi very short and thick ... *Margaropus.*

*DD.* Palpi elongate.

*E.* Palpi of medium length; more or less pointed at tips; dorsal shield allows a portion of the body to show along its antero-lateral edge ... *Rhipicephalus.*

*EE.* Palpi very long; dorsal shield covers all of anterior portion of body.

*F.* Eyes hemispherical ... *Hyalomma.*

*FF.* Eyes flat ... *Amblyomma.*

## GENUS IXODES, (LATREILLE.)

*Acarus* (ex. p.), Linnaeus (1758).

*Ixodes*, Latreille (1795).

*Cynorhaestes* (ex. p.), Hermann (1804).

*Crotonus* (ex. p.), Duméril (1822).

*Ixodes*, (Latreille), (Neumann, 1899).

Eyes absent. Palpi long. Anal groove opened or closed behind, but tangent to the anus by its anterior concavity. No terminal spurs on the tarsi. The *male* with the ventral surface covered with plates, as follows:—One pregenital plate between the sexual opening and the rostrum; two lateral epimeral plates more or less surrounding the stigmata and coxae; a genito-anal plate, of elongate pentagonal shape, between the sexual opening and the anus; an anal plate, triangular, pointed or circular, behind the preceding, the anterior end surrounding the anus, the base formed by the posterior margin of the body; two quadrangular adanal plates, parallel to the anal shield; dorsal shield leaving a margin more or less wide, uncovered on lateral and posterior margin of body; no posterior festoons. Stigmatic plates oval. *Female* with three longitudinal grooves on the posterior part of the dorsal surface; on the ventral surface two long genital grooves, extending from the sexual opening, and diverging caudad; also two small anal grooves united in front of the anus, parallel or diverging behind, rarely converging. Stigmatic plates circular.

The name *Ixodes* has served to describe the greater part of the *Ixodinae* of various countries and hosts. Although Koch gave a restrictive diagnosis, yet the inexperienced authors continued to include the most varied forms in this genus; most of the descriptions were incomplete, insufficient, and their identification usually impossible. Koch himself has added to the confusion by giving the rank of species to forms, which differ only in age, or stage of engorgement, shape or size, secondary points in a question of this sort.

The genus is sub-divided into three sub-genera—*Euiroxodes*, *Ceratiroxodes* and *Eschatocephalus*. These were formerly considered as three distinct genera, but Neumann considers that the characters which distinguished *Ceratiroxodes* and *Eschatocephalus* from *Ixodes* were not of sufficient importance to justify this distinction, therefore he included them in the genus *Ixodes*.

The three sub-genera are characterised as follow:—

*Euiroxodes*. Palpi long, valvate; no eyes, anal groove may be open or closed behind; in the male one pregenital, one genito-anal, two epimeral, one anal, and two adanal plates; stigmatic plates oval in male, circular in females.

*Ceratiroxodes*. Palpi long, convex inside, and with a conical prolongation in the male, and swollen at the end in the female. No eyes. Anal groove absent in female, but present in male. One anal and two adanal shields in the male; stigmatic plates circular in both sexes.

*Eschatocephalus*. Palpi long, claviform, and flat in the female, piriform and not valvate in the male; anal groove contouring anus in front and open behind. Stigmatic plates circular in both sexes. Irregular chitinous thickenings both above and below in the male. Stigmatic plates circular in both sexes.

So far only three forms of *Ixodes* are known in South Africa. *Ixodes pilosus* occurs in the Cape Colony and Orange River Colony, while its variety, *Ixodes pilosus howardi*, is found in the Transvaal and Natal. *Ixodes rubicundus* is reported and described by Neumann from specimens taken in Cape Colony.

#### *Males.*

A. Anal shield horseshoe shaped.

B. Male large, 3.15 mm. long by 1.6 mm. wide; teeth on hypostome in one marginal row, other rows represented by crenulations ... .. *pilosus*.

BB. Male small, 2.3 mm. long by 1.2 mm. wide; teeth on hypostome in three or four rows ... *pilosus howardi*.

AA. Anal shield rectangular; sides parallel, longer than wide.  
*rubicundus*.



*Females.*

A. Anal grooves converging behind the anus, but not joining.

B. Dorsal shield as wide as long; anal groove with branches not so close together at posterior end ... .. *pilosus*.

BB. Dorsal shield longer than wide; anal groove with branches closer together at posterior end  
*pilosus howardi*.

AA. Anal grooves parallel behind the anus... .. *rubicundus*.

## IXODES PILOSUS, KOCH.

## SHEEP PARALYSIS TICK.

*Ixodes pilosus*, Koch (1844, 1847).

*Ixodes pilosus*, Koch (Neumann, 1899).

*Male*.—*Body* oval; wider and rounded behind; length 3.15 mm.; width 1.6 mm.; colour clear reddish brown. *Shield* convex, covering all the dorsal surface, except a narrow marginal cushion, which is lighter coloured, shining, glabrous; cervical grooves of the normal length, well formed, punctuations very fine, abundant. *Ventral surface* with genital pore wide, opposite coxae III; pregenital shield trapezoidal; anal shield small, longer than wide, sides curved and converging like a horseshoe; anus with three hairs on each valve. On all the surface of the body many hairs, those on the ventral surface short and translucent, those on the epimeral shields reinforced at the base. *Rostrum* elongate; base twice as wide as long, in shape of a trapezoid opening in front on the dorsal surface, a little longer than wide on the ventral surface, where it is pentagonal in outline; mandibles with inner apophysis of digit applied to the dorsal surface in the anterior, where it has the appearance of being doubled; three teeth, the terminal small, the median one strong, and the basilar one weak, the outer apophysis with seven or eight teeth, the anterior ones progressively decreasing, and forming a crest, the posterior ones very strong; hypostome with a marginal series of six to eight teeth on each side, increasing in size from top to base; the remainder of the teeth are reduced to single transverse crenulations; palpi compressed from top to bottom, dorsal face flat, ventral face excavated, hairs scattered over the dorsal surface, in series on the inner margin. *Legs* slender; coxae elongate, coxae I with a strong spine on the postero-median edge; hairs on all the articles of the legs; tarsi slender, forming in leg I about a quarter of the length of the leg.

*Female*.—When unengorged, *body* flat, oval in outline, much wider and rounder behind; colour yellowish red; long whitish hairs on all the surfaces; when engorged resembles a castor-oil bean, slightly flattened, and becomes of a dark bluish black colour. *Shield* yellowish brown, lighter than the abdomen when young, glabrous, oval, somewhat pentagonal in outline, as wide or almost as wide as long; posterior lateral margins almost straight; cervical groove pronounced, reaching the posterior margin; lateral grooves well marked, and reaching the posterior margin; punctuations very fine, equal on all the surface; a few short, whitish hairs; integument with a few fine

white hairs. *Dorsal surface* with two short anterior grooves, a little divergent; three posterior grooves, the median one straight, and the lateral grooves concave inward; sexual orifice opposite the last intercoxal space; sexual grooves curved and converging at their posterior extremities; ano-marginal grooves curved inward, and approaching at their posterior ends, enclosing a horseshoe-shaped area; anus as in male; stigmatic plates whitish in young specimens, brownish later. *Rostrum* elongate; base reniform on dorsal surface, a little wider than long on the ventral surface, pentagonal in outline; porose areas elongate; mandibles elongate, inner apophysis with two backward projecting teeth, one terminal, the other in the middle of the length, a long point of insertion, ending near the posterior quarter of the digit; outer apophysis with five teeth, progressively increasing from tip to base; hypostome elongate, lanceolate, a series of small teeth at the tip, followed by three rows, more or less regular, of well developed teeth, one lateral row, with teeth strong and sharp, the anterior and posterior teeth weaker, a middle row with smaller teeth, and an inner row of still shorter teeth, not passing below the anterior half of the organ; palpi elongate, narrow, flattened and excavated as in male, article II especially elongate and narrow, constricted at the base. *Legs* slender, coxae elongate, contiguous when young, separated when female is engorged, coxae I, with a rudimentary spine on its posterior margin; hairs on all the articles; tarsi as in male.

*Hosts*.—On warm-blooded animals, such as ox, mule, horse, cat, dog, pig, leopard, bushbuck, man, sheep, and goat. Dönitz also reports a female as taken from a civet cat at Umtali.

*Habitat*.—Cape Colony, Orange River Colony, all South African Colonies, in grass districts (Lounsbury).

Lounsbury states that this tick is found in the grass districts of all the South African Colonies, but is never very common. It seems to prefer humid conditions, such as are furnished by ill-drained flats and ravines. It is difficult to rear. All stages seem to prefer the head and ears of the host animal, although they may be found on any part of the body. So far we have not found it in the Transvaal, its place being taken by the variety *howardi*; it is this tick which is supposed to cause the paralysis of sheep in Cape Colony.

#### IXODES PILOSUS, var. HOWARDI, NEUMANN.

*Plate IV, figures a to k.*

*Male*.—Similar to the type species except in the following points: a little smaller than *pilosus*, being 2.3 mm. long by 1.2 mm. wide, instead of 3.15 mm. by 1.6 mm.; the spine on coxae I is very weak; the hypostome (IV, f) has three to four rows of teeth on each half, instead of one row and crenulations; the teeth are arranged as follows: denticles at tip, then on each half one or two rows of three teeth each, the lower one of which may be reduced to only one very strong tooth; the inner apophysis of the mandibles has two equal teeth, with a basilar point of insertion (IV, i); the outer apophysis has five or six teeth instead of seven or eight.

*Female* differs from the type species as follows:—*Dorsal shield* (IV, a, c) longer than wide, 1.27 mm. long by 1.1 mm. wide, oval; cervical and lateral grooves less marked; punctuations finer, not so deep, more numerous. Hairs not so numerous on the dorsal and ventral surfaces (IV, a, b); anal groove with branches closer, and forming an ellipse open behind. *Rostrum* (IV, c) not so strong, 0.7 mm. long (instead of 0.85 mm. as in *pilosus*); porose areas smaller, not so deep, more widely separated. *Legs* much weaker, especially the coxae. Colour generally orange red when young.

*Larva* (unengorged).—*Body* oval in outline, longer than wide, widest behind coxae III; narrowed at both extremities; length 0.5 mm. (including rostrum), width 0.3 mm. *Shield* wide, covers all anterior half of body; broadly rounded behind; no anterior emargination for insertion of rostrum; no cervical or marginal grooves; a few large pits and spines present. *Dorsal surface* with seven grooves; no posterior festoons, but a few very large hairs on the margin. *Ventral surface* with three pairs of large spines in the median area between the coxae: six large spines surrounding the anus, and several spines in the postero-lateral areas; four posterior grooves; anus very far posterior; anal grooves surrounding anus behind; ano-marginal groove present. *Rostrum* with base much wider than long; triangular in outline, with prominent lateral angles; inserted on a long neck, articulated below the dorsal shield; palpi long and slender, article I very small, article II constricted at the base, wide at the distal extremity, twice as long as article III; hypostome very long and slender, with four rows of teeth, nine teeth to a row, the outer rows very large and sharp, the inner rows small and blunt; mandibles as in female. *Legs* very slender; coxae small, rectangular, coxae I with anterior angle prolonged so as to show on the dorsal side beyond the shield; each coxa with two posterior teeth, one on postero-lateral angle, and one on the postero-median angle; tarsi long and slender.

*Eggs*.—Dark brown in colour; surface smooth and shiny; elliptical in outline; length 0.5 mm., width 0.25 mm.

*Hosts*.—Dog, cat, hedgehog (*Erinaceus frontalis*), bat (*Rhinolophus* sp.)

*Habitat*.—Transvaal: Leydsdorp, Moodies (Barberton), Pilandsberg Mountains (Rustenburg District), Lenokana (Marico District), Pienaars River (Pretoria District), Zoutpansberg Mountains (Zoutpansberg District), Piet Retief; Durban.

The principal host of this tick seems to be the dog. Its complete life history has not yet been observed; the adults usually occur more abundantly on the head and shoulders of the dogs. It may prove to be concerned in the transmission of *piroplasmosis* of the dog when this question is fully worked out. In the Transvaal it is confined to low and middle or bushveld, and has never yet been taken on the extreme high grassy veld. As it also occurs at Durban, it will probably also be found all along the eastern coast of South Africa.



## IXODES RUBICUNDUS, NEUMANN.

*Ixodes rubicundus*, Neumann (1904).

Plate IV, figures 1 (a, b).

*Male*.—*Body*, 2.3 mm. (including rostrum) with an oval contour, narrower in front, 1.2 mm. wide, near the posterior third; chestnut brown. *Shield* convex, shining, glabrous, leaving a marginal cushion exposed, which is wider behind than on the sides, and from which it is separated by a deep groove; cervical grooves straight, superficial, prolonged and diverging near the middle of the length; no posterior festoons; numerous punctuations, small, unequal, regularly distributed. On the ventral surface [IV, 1 (a)] genital pore wide, between the coxae of the third pair of legs; pregenital shield long, triangular; genito-anal shield pentagonal, much longer than wide, with shallow punctuations, not very numerous; anal shield rectangular, with sides parallel, longer than wide, very finely punctured, adanal shields longer than wide, with sides parallel; no hairs; stigmatic plates large, circular. *Rostrum* short; base trapezoidal, larger in front, and wider than long, its posterior angles not salient on the dorsal surface, but so on ventral surface, separated by a similarly salient median pair; mandibles thick, inner apophysis with two strong teeth, the posterior stronger; outer apophysis with three teeth, the anterior small, the posterior very strong; hypostome [IV, 1 (b)] wide, teeth fused on each half into four transverse crenulations with three or four denticles, followed by a row of four or five teeth, and on each side with a very strong tooth; palpi short, the second and third articles almost of same length. *Legs* of medium length, brick red; coxae I with inner spine almost obsolete; the other coxae unarmed; tarsi of medium length, progressively attenuated.

*Female*.—*Body* in an elongate oval, may reach 10 mm. in length (rostrum not included) by 6.5 mm. wide at the posterior third, brick red on specimens of a small size, but chestnut coloured on others. *Shield* in a short oval, scarcely longer (1.6 mm.) than wide (1.4 mm.), with lateral edges a little convex and diverging from front to rear, then a right angle converging to form the posterior angle, which is rather narrow, anterior margin a little emarginate for the insertion of the rostrum; cervical grooves well marked; almost reaching the lateral margins; lateral grooves very pronounced; punctuations numerous, fine, slightly unequal, few in the lateral areas; surface shiny, glabrous, chestnut brown. *Dorsal surface* with scattered hairs; punctuations very superficial; three posterior grooves. *Ventral surface* with punctuations and hairs similar; genital pore opposite coxae IV, anus very anterior; anal grooves long, parallel, united in front of the anus; stigmatic plates small, circular, whitish. *Rostrum* 0.85 mm. long; dorsal base rectangular, much wider than long; porose areas oval, oblique, converging in front, situated near the lateral margin and separated by an interval equal to their width; on the ventral surface a retrograde spine behind the insertion of each palpus; mandibles with inner apophysis elongate, parallel to the shaft; outer apophysis with five teeth increasing in size from tip to base; hypostome elongate, narrow sublanceolate, with three rows of teeth on each side, the median one short, and with six to seven teeth, the middle one almost as long as the external one, which extends from the tip to the base,



and has fifteen to sixteen teeth; palpi long, rather slender, second article longer than the third. *Legs* slender, brick red; coxae I, II, and III flat, unarmed, with posterior margin sharp; coxae IV more swollen, with a small tubercle on the external third of the posterior margin; tarsi elongate, slender.

*Habitat*.—Cape Colony.

*Hosts*.—Sheep.

I have seen no specimens of this tick. The description is taken from that of Professor Neumann. It is supposed to transmit a disease of sheep (Neumann).

### GENUS HYALOMMA, KOCH.

*Acarus* (ex. p.), Linnaeus (1758).

*Ixodes* (ex. p.), Latreille (1796).

*Cynorhaestes* (ex. p.), Hermann (1804).

*Hyalomma*, Koch (1844).

*Hyalomma*, Koch (Neumann, 1899).

Eyes present, sometimes hemispherical, shining, in a sub-marginal pit of the shield, sometimes flat and scarcely salient. Rostrum long, with palpi valvate. Anal groove in a semi-circle, opening in front, joining the sexual grooves, and followed by a median ano-marginal groove. Body in an elongate oval. Colour brown, more or less intense. *Male* with ventral face provided with two pairs of plates; two anal plates, triangular, large, and two accessory plates, very small, narrow; often two accessory plates behind the anal plates; stigmatic plates comma-shaped with a long tail. Dorsal shield festooned on its posterior margin. Tarsi spurred. *Female* with stigmatic plates triangular; posterior margin of body festooned before repletion.

Koch made the distinction between this genus and *Amblyomma* depend on the eyes, hemispherical in *Hyalomma* and flat in *Amblyomma*. Neumann found that there were a great many intermediate stages between these two types of eyes, but that the presence of anal plates in the male of *Hyalomma* was an essential character. The females of *Hyalomma*, so far as known, he found distinct from *Amblyomma* by their orbited eyes and oval shields, instead of triangular or cordiform shields; also the eyes near the middle of shield instead of near the anterior third or fourth, as in *Amblyomma*. This genus has only a few species, two of which occur in South Africa, *H. aegyptium* with its variety *impressum* and *H. hippopotamense*.

The variety *impressum* seems to be more abundant than *H. aegyptium* in the Transvaal.

#### *Males.*

A. Dorsal shield shagreened ... .. *aegyptium impressum*.

AA. Dorsal shield with punctuations unequal but distinct.

B. Eyes prominent, black, spherical; punctuations of shield numerous, unequal, coxae I deeply divided

*aegyptium*.

*BB.* Eyes small, whitish; punctuations of shield unequal, few in number; coxae I conical ... *hippopotamense*.

*Females.*

*A.* Punctuations of shield coarse, unequal.

*B.* Eyes prominent, hemispherical, black; punctuations numerous but distinct; coxae I deeply divided

*aegyptium*.

*BB.* Eyes small, whitish; punctuations large, not very abundant, unequal; coxae I conical ... *hippopotamense*.

*AA.* Punctuations of shield fine ... *aegyptium impressum*.

HYALOMMA AEGYPTIUM. (LINNAEUS.)

THE BONT LEG TICK.

*Acarus aegyptius*, Linnaeus (1758).

*Acarus hispanus*, Fabricius (1794).

*Cynorhaestes aegyptius*, Hermann (1804).

*Ixodes camelinus*, Fischer de Waldheim (1823).

*Ixodes fabricii*, Audouin (1827).

*Ixodes savignyi*, Gervais (1844).

*Hyalomma dromedarii* (male and female), Koch (1844 and 1847).

„ *grossum* (female), Koch (1844, 1847).

„ *anatolicum* (female), Koch (1844, 1847).

„ *lusitanicum* (male and female), Koch (1844, 1847).

„ *aegyptium*, Koch (1844, 1847).

„ *fabricii*, Koch (1844, 1847).

„ *rufipes* (male and female), Koch (1844, 1847).

„ *truncatum* (male), Koch (1844, 1847).

„ *hispanum* (male and female), Koch (1844, 1847).

„ *impressum* (male and female), Koch (1844, 1847).

„ *syriacum* (male), Koch (1844, 1847).

„ *excavatum* (male), Koch (1844, 1847).

„ *marginatum* (male), Koch (1844, 1847).

*Ixodes gracilentus* (nymph), Lucas (1845).

*Ixodes hispanus* (female), Kolenati (1857).

*Ixodes corniger* (male), Kolenati (1857).

*Ixodes africanus*, Mégnin (1876).

*Hyalomma dentatum*, Canestrini et Fanzago (1877, 1878).

*Hyalomma corniger*, Murray (1879).

*Hyalomma hispanicum*, Murray (1879).

*Ophiodes gracilentus*, Murray (1879).

*Ixodes algeriensis*, Mégnin (1880).

*Hyalomma utriculus*, Berlese (1889).

*Hyalomma algeriense*, Canestrini (1890).

*Hyalomma aegyptium*, (Linnaeus) (Neumann, 1899).

*Plate V, figures e, f, n.*

*Male*.—*Body* flat; oval; widest opposite coxae IV; caudal extremity truncate, length 3.5 to 4 mm. (rostrum not included), width 2.25 to 3 mm. *Shield* (*V, f*) deep chestnut brown; covering all the dorsal surface, except a narrow marginal border on fully engorged specimens, which is yellowish white; prolonged in a point on each

side beyond coxae I, and extending up to the middle of the length of the base of the rostrum; cervical grooves deep, converging at first, then diverging, becoming wide and shallow; lateral grooves beginning just behind the eyes, and widening as they proceed caudad; eyes black, hemispherical, shining, in a sub-marginal pit near the anterior quarter; punctuations numerous, unequal, scattered over all the surface, large and abundant near margins; a few very short hairs, sometimes three posterior grooves, the median longer, eleven posterior marginal festoons; the median inclined to be triangular; two dorsal porose areas, one on each side and close to the median line, near middle of length of shield, dark coloured and difficult to see. *Ventral surface* yellowish white or brownish; numerous short hairs; sexual orifice opposite first inter-coxal space; anus near posterior third, opposite stigmatic plates; anal plates of a deep brown, more or less elongate, narrow, outer margin reaching almost to level of anterior margin of stigmatic plates, inner margins longer than posterior, and slightly concave, posterior margin truncate; punctuations few, large, a few stout whitish hairs; outside of each anal plate and separated from it by the coxal groove, is a very narrow elongate, accessory plate, chitinous only in its caudal third; opposite and behind each anal plate is a conicle prominence, chitinous, dark brown, sometimes passing beyond the posterior margin; stigmatic plates in the form of a very elongate comma, the posterior extremity of which nearly reaches and sometimes passes beyond the level of the extremity of the accessory anal plates; ano-marginal groove well marked. *Rostrum* elongate; base much wider than long; posterior angles scarcely salient; lateral edges convex; a few large punctuations on dorsal surface, sometimes in a transverse line; mandibles with inner apophysis narrow at base, with tip slightly recurved, transverse process a little below anterior extremity bearing two teeth, the lower slightly larger than the upper; outer apophysis with two teeth, lower one stronger, hypostome spatulate, rounded at tip with numerous denticles, then three rows of ten to twelve teeth on each half, sharply pointed, outer row longer, below these the teeth are squamiform in three rows extending almost to the base; palpi elongate, narrow, valvate; article I with dorsal face a half shorter than ventral face, which is prolonged on the inner edge in a longitudinal apophysis, longer than the article, inner edge bears long hairs directed inward and forward; article II a little shorter than article III on the ventral surface, prolonged on its dorsal surface into an obtuse, flat point, fitting over article I, long hairs on the inner margin of articles II and III; article III as long as wide; article IV very small, a mere hairy papilla in a ventral pit of article III. *Legs* long and stout, pair IV passing beyond the posterior end of abdomen by the last two articles or less; articles III, IV, and V reddish brown, ringed with whitish on distal halves; tarsi I unarmed, a false terminal article in form of a truncate cone, widened behind false articulation; those of other legs with parallel sides, gradually attenuated on their dorsal margins, two short, stout spines; tarsi IV at least four times as long as wide; caruncle short, reaching scarcely half the length of the claws; coxae large, almost contiguous, dark brown, coxae I divided into two long teeth, the inner shorter and wider, a tuberosity near the postero-external angle of coxae II and III: one on each posterior angle of coxae IV.

*Female* (unengorged).—*Body* flat, oval, widest opposite coxae IV, truncate on posterior margin; deep chestnut brown in colour; 4.5 mm. long (rostrum not included), 3 to 3.5 mm. wide. *Shield* oval, almost hexagonal, glabrous, as wide or a little wider (2.5 mm.) than long, the posterior margin convex, the postero-lateral margins concave, antero-lateral margin convex; cervical grooves deep, narrow, and converging at first, then wide, superficial and diverging behind; marginal grooves lacking; represented by a raised margin; eyes black, hemispherical, shining, near the lateral angles in deep, sub-marginal pits; cervical emargination shallow; punctuations very unequal. *Dorsal surface* (V, c) with three longitudinal grooves, the lateral divided into two unequal branches at the margin close to the edge, eleven caudal festoons; large transverse folds and pits between the dorsal grooves; short whitish hair on all the surface, two dorsal porose areas, one on each side and close to the median line, just caudad of the shield, small and dark coloured. *Ventral surface* with similar hairs and a few medium-sized punctuations; sexual pore narrow, opposite coxae II; anus near posterior third; ano-marginal groove present; a short groove on each side of it; stigmatic plates large, dark chestnut coloured, triangular, almost as wide as long, angles rounded, postero-lateral angle projecting laterally. *Rostrum* similar to that of male except that it is slightly longer (1.5 mm.), and possesses the porose areas, which are elongate, elliptical, and not very deep; the mandibles differ from those of the male as follows: inner apophysis slightly recurved and sharp at the tip, not far from the extremity is borne a transverse process with three sharp teeth; the outer apophysis has a wide base, and bears three teeth, the anterior of which is very small, the other two are large and strong; hypostome and palpi like those of the male. *Legs* like those of the male; coxae like those of the male except that they are not contiguous.

When fully *engorged* the female may attain a size of 20 mm. long by 18 mm. wide, and almost as thick as wide, sides almost parallel, glabrous, or almost so. Colour chestnut brown, lighter than that of shield, sometimes whitish before complete engorgement, often the marginal groove appearing as a whitish line. Hairs and grooves disappear when fully engorged, previous to that stage the anterior grooves appear on the dorsal surface and diverge behind.

*Nymph*.—*Body* short, oval, more or less swollen, of a colour varying from yellowish white to chestnut brown, 2 to 4 mm. long. *Shield* similar to that of female. *Stigmatic plates* small, nearly circular.

*Hosts*.—All domestic animals, including horse, mule, ass, sheep, antelope, deer, dog, cat, man, dromedary, camel, ox (the last three by preference), and the following wild animals: giraffe, reed buck, and wild boar. They prefer the regions of the genitals.

*Distribution*.—Algeria, Tunis, Morocco, Tripoli, Teneriffe, Egypt, Abyssinia, Asia Minor, Persia, Afghanistan, Turkestan, China, India, Mongolia, Senegal, German East Africa, Moçambique, Somaliland, Natal, Cape Colony, Orange River Colony, Transvaal, Walfish Bay, Greece, Crete, Sicily, Sardinia, Italy, Southern France, Spain, Portugal.



This species does not seem to be abundant in the Transvaal, its numbers being far surpassed by one of its varieties, *impressum*. I have never been able to obtain an engorged female so as to be able to rear the various stages of the life-cycle. A comparison of the few specimens which I have collected, however, reveals the following variations from the description as given by Neumann. The male is much smaller than Neumann states, and the outline of the body is altered by the posterior end being cut off almost square, or truncate. The shield is never lighter in the middle, and the median festoon was never found to be white. The cervical projections of the shield are much shorter than indicated in Neumann's figure, as is also the length of the rostrum. But the greatest difficulty exists in the punctuations of the shield. Instead of the punctures being evenly distributed over all the shield, those in a triangular, sunken area, whose base is the caudal margin, are confluent, rendering this area shagreened. The female varies only in one respect, i.e. the lateral of the three grooves in the dorsal surface of the body in the unengorged specimen does not branch into two unequal arms, but remains single.

This species is so variable that it was originally described under a large number of names, as shown by the long list of synonyms. Neumann was the first to study the various types carefully and bring them together under one name. He, however, noted three frequent variations from the type, and described them as varieties of the species.

#### HYALOMMA AEGYPTIUM, var. IMPRESSUM. NEUMANN.

*H. aegyptium* (Linn.), var. *impressum*, Neumann (1901).

Plate V, figures *a* to *d*, *g* to *m*, *o*, *p*.

*Male*.—Differs from the type species in the following characters: *Dorsal surface* widely rounded behind and not truncate; larger than the type, length 4.3 to 5 mm. (without rostrum), width 3.0 mm. to 3.5 mm. *Shield* (V, *a*) convex; punctuations equal, small and so abundant as to render the surface shagreened, instead of unequal punctuations and a posterior triangular shagreened area; cervical grooves longer, but posterior grooves, marginal grooves, and caudal festoons almost obliterated; shagreening more marked towards the edges; median festoon rectangular, elongate; lateral tail of stigmatic plates narrower and longer (V, *o*).

*Female*.—Differs from specific type as follows: (Unengorged) larger than type, 6 mm. long by 4 mm. wide. *Body* (V, *c*, *d*) elliptical in outline, widely rounded behind and not truncate as in type; shield larger, 2.75 mm. long, and nearly as wide; punctuations equal, fine, very abundant, making the shield shagreened; cervical emargination deeper; cervical and lateral grooves not so strongly marked. *Dorsal surface* (V, *c*) in unengorged female more thickly and deeply punctured.

*Nymph*.—(Only this variety has, with us, laid eggs and development followed in confinement.) *Body* (unengorged) broadly

oval; length (with rostrum) 1.5 mm., width 0.9 mm.; colour, bluish grey. *Shield*, covering anterior half of body, wider than long; antero-lateral margins convex, postero-lateral margins concave; posterior angle broadly rounded; cervical emargination shallow; cervical grooves widely separated, very distinct, first convex, then straight to postero-lateral edges; surface divided into polygonal areas by shallow grooves—no punctuations; eyes very large, hemispherical, dark coloured, shining, in orbits at lateral angles; colour light yellowish brown, varying in depth of colour and sometimes with darker spots. *Dorsal surface* (V, i) with short whitish hairs; three grooves, median straight, lateral concave, facing inward, all extending from shield to caudal margin; laterals join cervical grooves of shield. *Ventral surface* (V, k) same colour as dorsal, and hairs same; stigmatic plates large, almost circular, and whitish in colour. *Rostrum* light yellowish, base wider than long, pointed sharply at lateral edges so as to appear broadly triangular; palpi elongate; article II more than twice as long as article III; mandibles like those of the female; hypostome spatulate, two rows of teeth on each half, teeth large, strong and sharp. *Legs* stout, pale, yellowish in colour, with numerous long whitish hairs; coxae rectangular; coxae, each bearing two blunt teeth on their posterior margin, those on coxae I sharp.

(Engorged) *Colour* from light yellowish to dark bluish, paler about shield and on margins. *Body* elliptical, sides parallel, length 4.5 to 6 mm., width 3 to 4 mm. *Shield* becomes a uniform chestnut brown. Integument of dorsal and ventral surfaces, with numerous irregular-shaped papillae, larger near the posterior end where they are often confluent. Coxal grooves begin opposite coxae II, approach each other anterior of anus, and then sharply diverge. Ano-marginal groove present. On dorsal surface two anterior diverging grooves, three posterior grooves, median longest, laterals concave near caudal end.

*Larva* (unengorged).—*Body* elongate, oval, widely rounded behind; length .75 mm., width .5 mm.; colour light yellowish, with internal organs showing through, giving it sometimes a greyish appearance. *Shield* covers anterior half of body; light reddish brown in colour, wider than long, broadly rounded at angles; cervical emargination shallow; cervical grooves well marked, extending to near posterior margin; eyes large, hemispherical, light coloured, shining in orbits at lateral angles, surrounded by a spot of very dark colour; fine punctures evenly distributed over the surface; a large spine at each angle of cervical emargination. *Dorsal surface* (V, g) with five shallow grooves, one median; nine caudal festoons, well marked. *Rostrum* light coloured, base sharply pointed on lateral edges, triangular in outline on dorsal surface; palpi elongate, article II twice as long as article III; hypostome spatulate, two rows of eleven or twelve stout pointed teeth on each half; mandibles like those of the female. *Ventral surface* (V, h) like dorsal; a pair of long spines in median area, opposite coxae I, another opposite second inter-coxal space, and a third opposite coxae III; four pairs of stigmatic openings, between coxae I and II, II and III, behind coxae III, and one pair near caudal margin. *Legs* slender, tarsi swollen, but tapering rapidly to a point; coxae large; sharp spine on posterior

margin of coxae I, a smaller one on coxae II, and one almost obsolete on coxae III. (Engorged) *Body* broadly oval, slightly longer than broad; colour dark bluish grey, except a round shield at anterior end, which is dirty yellow; no grooves on either surface. *Shield* becomes entirely of a reddish brown colour. Length 1.5 mm., width 1.3 mm.

*Eggs*.—Very small, light brownish in colour, elliptical in outline, surface smooth, 0.5 mm. long by 0.3 mm. wide.

*Hosts*.—The hosts are much the same as for the type. Adults attack nearly all warm-blooded animals, and are common on ox, sheep, goat, horse, dog, hare, and even ostriches, fowls and man; it prefers the feet and under parts of such animals. The larvae and nymphs feed on the heads of fowls, birds, hares, rabbits, and have frequently been taken from the ostrich.

*Distribution*.—This variety seems to be very common throughout the greater part of South Africa, usually in greater numbers than the type. I have received it from Cape Colony, Natal, and the Transvaal, and Neumann reports it from Senegal.

This tick is found even in the driest parts of South Africa, and unfed adults may be frequently found moving about the ground or hidden under bark of trees at outspans. It is one of the ticks with two hosts; the larvae and nymph requiring only one host; the newly transformed nymph settles down next to the old larval skin without dropping from the host. The whole life-cycle probably occupies a year.

### HYALOMMA HIPPOPOTAMENSE, (DENNY.)

#### THE HIPPOPOTAMUS TICK.

*Ixodes hippopotamensis* (male), Denny (1843).

*Ixodes bimaculatus* (female), Denny (1843).

*Amblyomma hippopotami*, Koch (1844, 1847).

*Amblyomma hippopotamense* (Denny), (Neumann 1899).

*Hyalomma hippopotamense* (Denny), (Neumann 1906).

#### Plate IV, figure m.

*Male*.—*Body* in a short oval, widely rounded behind, 5.8 mm. long by 5.3 mm. wide. *Dorsal shield* shining, convex, with punctuations unequal, rare, a few large and deep; no marginal groove nor posterior festoons; cervical grooves deep in front, prolonged behind to the limits of a pseudo-shield like that of the female; general colour of the shield clear, ochre yellow, or dirty yellowish white with linear designs and punctuations deep brown; the designs consist of a line which cuts off a space like a female shield and expands to the level of the eyes; two lines follow the cervical grooves and delimit a violin-shaped space; behind the limit of this pseudo-shield a fine transverse line, ending in two oblique spots; from the margin extend short, radiating lines, three of which join at each side to a longitudinal, discontinued line; those of the posterior margin represent the limits of the absent festoons; the median is prolonged to the transverse line, which is crossed at the level of the stigmatic plates by a transverse band; eyes small, whitish, hemispherical. *Ventral surface* (IV, m);

anal plates large, wide, triangular, almost twice as long as wide, inner margin concave, outer and posterior convex; the colour is deep chestnut; a few large bristling hairs on the posterior part; stigmatic plates comma-shaped, chestnut coloured, lighter on the periphery, and surrounded by an outer concave margin; a small supplementary ivory-like plate. Base of *rostrum* reddish brown, lateral margins whitish; palpi yellowish white on their dorsal surface. *Legs* of medium length; articles whitish on their dorsal margin and at the distal extremity; coxae I conical, with point thick, recurved backward and a little outward; near the postero-external angle a narrow long spine.

*Female*.—*Body* oval, flat, 8 to 8.5 mm. long. *Dorsal shield* cordiform of same colour as that of male, with design similar to that of male; punctuations large, more abundant than in male; inside the eyes a small oblique spot; eyes as in the male. *Dorsal surface* deep reddish brown, traversed by longitudinal grooves, punctured, wrinkled; a marginal groove and posterior festoons near the posterior third, inside the marginal groove, and, on each side, a large light-red spot, rounded, salient, smooth; abundant hairs on the remainder of the dorsal surface. Stigmatic plates as in male. *Rostrum* and *legs* as in male.

*Hosts*.—*Hippopotamus amphibius*.

*Habitat*.—South Africa, East Africa.

I have never seen a specimen of this species, and the above description is compiled from those given by Neumann in his "Révision de la Famille des Ixodidés."

#### GENUS MARGAROPUS. KARSCH.

*Margaropus*, Karsch (1879).

*Boophilus*, Curtice (1890).

*Rhipicephalus*, Neumann (1897).

*Margaropus*, Karsch (Neumann, 1907).

*Rostrum* short; palpi, more or less angular; eyes present. No anal groove. Stigmatic plates circular or oval; two anal plates, free or united in part, with or without accessory plates in the male. A strong terminal spur on the tarsi.

There are only two species, with several varieties, in this genus, *M. annulatus* and *M. lounsburyi*. It was a study of the latter species which he made in 1907 that caused Neumann to re-erect this genus. A study of both sexes of *M. lounsburyi* made him conclude that it was closely related to *R. annulatus*, which had always been causing so much difference of opinion as to whether it should stand in a separate genus, or form a sub-genus of *Rhipicephalus*. The females were so closely similar that they plainly could not be separated, while in the males the absence of anal grooves and the circular form of the stigmatic plates clearly sets them off from *Rhipicephalus*, although they do not resemble each other in other details, such as in the form of the anal plates. The new species made him decide that they should



be placed together in a separate genus. The name *Margaropus* was given to the genus because this name had been given by Karsch to a form from Chili prior to the proposing of the generic term *Boophilus* by Curtice in 1890. As it happened, the form which Karsch named (*M. wenthemii*) was a monstrosity, of one of the varieties of *R. annulatus*; the legs of the male individual were very flat and dilated as in the male of *lounsburyi*; but according to article 27, of International Rules of Zoological Nomenclature, *Margaropus* has the priority over *Boophilus*, since it refers to the part of the species named first.\*

#### Males.

- A. Four anal plates, free in front of anus; legs sub-cylindrical.
- B. Hypostome with six rows of teeth; anal plates pointed at posterior tips; caudal appendage blunt, but always present ... .. *annulatus decoloratus*.
- BB. Hypostome with eight rows of teeth; anal plates square cut at posterior ends; caudal appendage small and conical, often absent ... .. *annulatus australis*.
- AA. Two anal plates, united in front of the anus; articles of legs very much dilated, articular angles deep... *lounsburyi*.

#### Females.

- A. Articles of legs sub-cylindrical; spur short, ambulacra sub-terminal.
- B. Hypostome with six rows of teeth; mandibles with lesser process bicuspid ... .. *annulatus decoloratus*.
- BB. Hypostome with eight rows of teeth; mandibles with lesser process tricuspid, centre of shield usually yellowish ... .. *annulatus australis*.
- AA. Articles of legs dilated at distal extremities; spur very long, ambulacra inserted at dorsal border of spur, remote from the tip ... .. *lounsburyi*.

#### Nymphs.

- A. Shield as wide as long ... .. *lounsburyi*.
- AA. Shield longer than wide ... .. *decoloratus* and probably *australis*.

#### Larvae.

- A. Coxae I bicuspid, three pairs of stigmatic openings *australis*.
- AA. Coxae I without teeth, four pairs of stigmatic openings. *decoloratus*.

\* In "Bericht über den XIV Internationalen Kongress für Hygiene und Demographie," II, p. 179, appears a paper by Dönitz in which he treats of the ticks transmitting Texas fever or redwater. He claims that the specimen upon which Karsch founded his genus *Margaropus* was not a monstrosity, as claimed by Neumann, but is in every way identical with the species *M. lounsburyi*, Neumann. If this is the case, we must then retain the genus *Boophilus*, our blue ticks becoming *Boophilus annulatus decoloratus* and *Boophilus annulatus australis*, while *M. lounsburyi* becomes only a synonym of *Margaropus wenthemii*, Karsch. The question now arises as to how this *M. wenthemii* came into South Africa from South America. Undoubtedly it was brought out some years ago on Argentine horses.

MARGAROPUS ANNULATUS, var. DECOLORATUS,  
(KOCH).

THE BLUE TICK.

*Rhipicephalus decoloratus*, Koch (1844, 1847).

*Rhipicephalus decoloratus*, Koch (Neumann, 1897).

*Rhipicephalus annulatus*, (Curtice), var. *decoloratus*, (Koch)  
(Neumann 1901, 1904).

*Margaropus annulatus*, (Curtice), var. *decoloratus*, (Koch) (Neumann 1907).

Plate VI, figures *a* to *o*.

*Male*.—*Body* oval, narrowed in front, presenting its greatest width (1.0 to 1.5 mm.) at the level of the stigmatic plates, length 2.0 to 2.75 mm.; integument very thin, often allowing the ramifications of the intestines to show through. *Shield* (VI, *a*) reddish brown, covering all the dorsal surface, prolonged on each side of the rostrum in front by two horns, the inner of which is smaller; two cervical grooves, shallow and wide, extending to the posterior margin, interrupted in the middle and widened into a shallow pit at its resumption; a median groove in the posterior half, posterior festoons scarcely marked, except the median ones, which are indicated by scallops; punctuations large, superficial; numerous short hairs scattered all over the shield, which is finely wrinkled; eyes pale, very small, often almost invisible, at level of first inter-coxal space; dorsal porose areas at posterior third of length, very small and well separated. *Ventral surface* (VI, *b*) same colour as dorsal, with numerous long, whitish hairs on all its extent; sexual orifice wide, situated a little behind the level of the anterior margins of coxae II, a large triangular plate forms its posterior margin; anus near posterior quarter of length; on each side of the anus an elongate plate, extending forward as far as the posterior margin or middle of coxae IV, anterior end pointed, inner margin longer and prolonged into a conical point on posterior end; posterior margin emarginate; outside of each anal plate another much smaller and narrower, but of almost same shape as first; both of these pairs of plates may extend beyond the posterior margin of the body; a strong conical caudal prolongation of the body on the median line; truncate on the tip and curved downward; stigmatic plates almost circular, large. *Rostrum* (VI, *c*) very short, dorsal base hexagonal, wider than long; lateral angles very sharp, inserted into a rather shallow emargination of the shield; ventral base semi-circular; mandibles (VI, *f*), with inner apophysis of digit, bearing a transverse process with two sharp teeth; outer apophysis with two teeth, the lower large and strong, the upper very small and sub-terminal; hypostome short and wide, emarginate at tip, numerous denticles on anterior end followed by three rows of large teeth on each half; palpi short, sub-conical, with articles as wide as long; article I concealed in part under anterior dorsal margin of base of rostrum; article II constricted at base, widened in middle into a prominent crest on both inner and outer margin; numerous strong spines, especially on inner margin; article

III swollen, sub-triangular on dorsal surface, transverse crest present on ventral surface; article IV small, sub-conical, in a pit on antero-ventral part of article III. *Legs* strong; coxae large, contiguous, as wide as long; coxae I prolonged anteriorly into a long point which extends beyond the cervical angle of the shield and is visible from above; posterior margin divided into two short, stout teeth, sometimes not very prominent; coxae II and III, with the two posterior teeth, barely indicated; tarsi terminated by a strong recurved spine preceded by a smaller one on the ventral margin of coxae II, III, and IV; caruncle almost half as long as the claws; stiff hairs on all the articles.

*Female*.—*Body* elliptical, as wide in front as behind, generally a little constricted in the middle near the level of coxae IV; length 10 mm. by 6 mm. wide; when unengorged, length 2 mm. by 1.1 mm. wide; colour, when unengorged, bluish or yellowish, with darker bands and lines, shield capitulum and legs light reddish brown, shield lighter in posterior part between cervical grooves; when engorged of a deep bluish colour (brownish in alcohol), with yellowish lines marking the ramifications of the intestines. *Shield* (VI, *d*) very small, longer than wide, emargination in front to receive the rostrum, very shallow; lateral edges straight and parallel, then curved and converging from the level of the eyes, posterior angle widely rounded; cervical grooves diverging, dividing the shield into three unequal parts, the middle portion widest and flat, the lateral portions arched; eyes small, near the anterior third; punctuations small and few; hairs numerous and long, mostly in cervical angles of the shield. *Dorsal surface*, with three antero-posterior grooves, interrupted near the middle, stopping a little distance from the shield and posterior margin, all of these nearly effaced in extreme engorgement; a few short hairs present on all the surface, each in a deep pit when unengorged. *Ventral surface* same colour as dorsal, and with hairs same; sexual orifice small, very anterior, narrow, opposite coxae I; sexual grooves commencing at level of coxae II, slightly divergent, and extending to near posterior margin; stigmatic plates a very short oval, nearly circular; anus near posterior third; no anal groove; ano-marginal groove long. *Rostrum* (VI, *d*) like that of the male in form, larger, base a little wider, more salient in front of shield into which it does not fit so deeply; mandibles (VI, *e*) with transverse process of inner apophysis, bicuspid, outer apophysis with three teeth, two lower teeth large and strong, anterior small and sub-terminal; hypostome as in male; palpi as in male, except that they are longer. *Legs* rather short and slender, first pair shortest, yellowish brown in colour; coxae longer than wide, coxae I sub-triangular, posterior margin divided into two teeth, more or less well developed; coxae II, III, and IV with posterior teeth barely indicated; tarsi as in male.

*Nymph*.—*Body* elongate, oval, very narrow behind and wide in front; length 1.3 mm. by 0.9 mm. wide when unengorged, when engorged 2 mm. long by 1.3 mm. wide. Colour light, yellowish or greyish with dark streaks and lines, as in unengorged female. *Shield* legs and capitulum light reddish brown, with a red spot lateral of the cervical grooves on the shield; lateral areas of shield darker coloured. *Shield* longer than wide, lateral angles near the

middle of the length, cervical emargination shallow, cervical grooves superficial and diverging, postero-lateral margins straight, posterior angle truncate; a few hairs and pits present. *Dorsal surface* (VI, *m*) with three longitudinal grooves, the median longest; a few long whitish hairs on the surface, each in a deep pit; constrictions opposite each of the coxae. *Ventral surface* like the dorsal; anus a little posterior of the middle of the length; three long spines on each valve, two posterior and one anterior; no anal groove; ano-marginal groove long, genital grooves deep and only slightly divergent, reach almost to the posterior margin; stigmatic plates large and almost circular; no caudal festoon. *Rostrum* short, base wide and narrow on dorsal surface, with sharp lateral projections; ventral surface nearly semi-circular; hypostome narrower than in adult, with three rows of teeth on each half; mandibles (VI, *g*) as in male; palpi short, cylindrical, with numerous stout hairs. *Legs* short and thick; coxae rectangular, except coxae I, which are triangular; no teeth on coxae; tarsi short and thick, no spurs present.

*Larva*.—*Body* oval (when unengorged), a little narrowed in front, broadly rounded behind; length 0.3 mm., width 0.3 mm.; when engorged 1.1 mm. to 1.3 mm. long, by 0.9 mm. wide; colour yellowish, with shield darker. *Dorsal shield* thin, covering more than half of the dorsal surface, almost as wide as long; widely rounded behind; cervical emargination shallow; cervical grooves short and deep. Both *dorsal and ventral surfaces* (VI, *n, o*) with numerous fine short whitish hairs; *anus* large, near posterior quarter; one large spine on posterior part of each valve; stigmatic openings in four pairs, one behind each pair of coxae, and a posterior pair further back; a pair of large spines on the median ventral area opposite I and II intercoxal intervals and opposite coxae III caudal festoons present. *Rostrum* as wide as long, base an elongate rectangle on dorsal surface, semi-circular on ventral surface; mandibles as in female; hypostome narrow, spatulate, with two rows of six or more teeth on each half; palpi with articles cylindrical, without lateral projections, provided with long hairs; article IV relatively large, inserted obliquely within and behind on article III. *Legs* relatively strong; coxae large and triangular, no teeth present; tarsi short and thick, terminating in curves, without spurs; caruncle one-third the length of the claws.

*Hosts*.—Cattle, mules, horses, donkeys, sheep, goats, and dogs, although cattle are its chief hosts.

*Distribution*.—In South Africa generally, Cape Colony, Orange River Colony, Transvaal, Natal, Rhodesia, German South-West Africa, Madagascar, Mauritius, Congo, Uganda, German East Africa, Mozambique, Cape Verde Islands.

This is one of our commonest ticks in South Africa, and is found nearly everywhere. There are two or three generations in each year. It is the transmitter of redwater of cattle, or Texas fever as it is known in America, where the type *M. annulatus* transmits this disease. In South America and Australia the same disease is transmitted by other varieties of the same species of tick.



## MARGAROPUS ANNULATUS, var. AUSTRALIS, (FULLER).

*Rhipicephalus australis*, Fuller (1899).

*Rhipicephalus annulatus*, (Curtice), var. *australis*, (Fuller), (Neumann, 1901, 1904).

*Margaropus annulatus*, (Curtice), var. *australis*, (Fuller), (Neumann, 1907).

Plate VI, figures p to s.

*Male* (VI, p, q) differs from *decoloratus* as follows:—A little smaller, more regularly oval in outline, less contracted in front; hairs much more abundant. No indications of caudal festoons; caudal prolongation small and conical, sometimes wanting; hypostome with eight rows of teeth; mandibles with transverse process of inner apophysis tricuspid (VI, r); spines of coxae I more deeply separated; articles of legs relatively more slender; oval stigmatic plates not pointed on caudal extremity.

*Female* differs from *decoloratus* as follows:—Slightly smaller when engorged, tending to a globose form and not elongate; dorsal shield a third smaller and relatively wider, usually yellowish in the middle; eyes not so apparent. *Rostrum* very short; mandibles as in male; hypostome with eight rows of teeth.

*Hosts*.—Same as *decoloratus*, cattle, horses, deer, buffalo, etc.

*Distribution*.—Australia, Borneo, Sumatra, Singapore, and southern districts of Cape Colony.

Lounsbury mentions this tick as occurring in the south-east districts of the Cape Colony, very commonly on cattle. There was some doubt in my mind as to whether it was really *australis* or not, until I received some specimens from Kingwilliamstown, C.C., along with *decoloratus*. They certainly conform to the characters given for *australis*. This variety also transmits redwater of cattle. *M. annulatus* is an American species, and was first described in 1821 by Say as *Ixodes annulatus*. Since then there has been a difference of opinion by various workers as to whether this species should belong to the genus *Rhipicephalus*, or form a separate genus by itself. In 1891 Curtice proposed to form a genus *Boophilus* for its reception. This was adopted by most American authors, but when Neumann prepared his "Révision de la Famille des Ixodidés" (1907), he placed it in genus *Rhipicephalus*, considering that the characters were not distinctive enough to form a separate genus. He, however, gave it the rank of a sub-genus, so that *Rhipicephalus* was composed of the sub-genera *Euripicephalus* and *Boophilus*. In 1906, however, he received some specimens of a tick from South Africa, the characters of the males of which were very peculiar, but the females of which were so similar in all essential characters to those of *R. annulatus* that he came to the conclusion that these two species were worthy of being raised to a separate genus, and called it *Margaropus*.

In various parts of the world there are ticks closely resembling *annulatus*, so much in fact that they are distinguished with difficulty and were once thought to be identical with *annulatus*. In each case these ticks transmit Texas fever, or redwater.

Fuller made a careful study of these varieties, using the following characters for comparison :—

1. Furrows on dorsal shield of female.
2. Number of rows of teeth on the hypostome.
3. Form of the mandibles, especially inner apophysis.
4. Extent of dorsal shield of male.
5. Presence or absence of tail in male.

The following tables show the relationship of the South African varieties and the type as worked out by Fuller :—

- I. Furrows of dorsal shield of the female extending to the posterior lateral margin—*annulatus*, and vars. *decoloratus* and *australis*.
- II. Hypostome with eight rows of teeth—*annulatus* and var. *australis*.  
Hypostome with six rows of teeth—var. *decoloratus*.
- III. Mandibles with inner apophysis tricuspid—*annulatus*.  
Mandibles with projections as well—var. *decoloratus*.  
Mandibles with inner apophysis tricuspid and presenting a rounded projection—var. *australis*.
- IV. Male with shield extending to the posterior margin—*annulatus*, var. *decoloratus*, and var. *australis*.
- V. Male with an indication of a tail—*annulatus*.

Male with distinct, horny tail—var. *decoloratus* and var. *australis*.

Based upon these studies Fuller thought himself justified in re-establishing Koch's *decoloratus*, and in making the Australian type a distinct species.

Neumann, after a careful study of a very large quantity of material, came to the conclusion that the above distinctions were insufficient from a specific point of view, and decided to make them only varieties of the original species *annulatus*. He found that the hypostome in the male bore quite constantly eight rows of teeth, but in the female this number varied more ; even in the varieties supposed to bear six or ten rows of teeth, he found them frequently with a tendency to eight rows ; even in the type itself there is a tendency to division. The conditions of the inner apophysis of the mandible he found to vary considerably with the condition of the preparation studied, and therefore he thought that the tricuspid appearance was due to some tendon at the base, looking like a third tooth. He also found the caudal prolongation in the male of *australis* sometimes almost disappearing.

I, myself, have been unable to find eight rows of teeth in *decoloratus* or the third row dividing.

#### MARGAROPUS LOUNSBURYI, NEUMANN.

LOUNSBURY'S TICK.

*Margaropus lounsburyi*, Neumann (1907).

Plate VII, figures *a* to *e*.

*Male*.—*Body* flat, oval, with sides convex, wider near the middle of the length, terminated behind by a conical prolongation, longer than wide, and wider than thick ; total length (from the anterior extremity of the

rostrum to the caudal extremity of the prolongation) 3.9 mm. to 4.3 mm. ; width 1.9 mm. to 2.3 mm. *Snout* (VII, *b*) a little convex, narrow, dark brown, brilliant, not covering all the dorsal surface, leaving free a narrow margin on each side, which is finely striated, and is prolonged behind the regularly rounded border of the shield, by the caudal appendix ; in front a deep emargination to receive the contraction of the rostrum ; a few very short hairs behind the surface corresponding to a female shield ; punctuations very rare, small, unequal ; cervical grooves superficial, reaching almost to the anterior third of the length of the shield ; no marginal groove and no posterior festoons ; three posterior longitudinal grooves, the median one a little shorter than the other two, which extend almost half the length of the shield ; eyes very small, depressed, scarcely visible, marginal, behind the emergence of legs I ; marginal border clothed, especially in the posterior half, with long hairs joined by six to ten into transverse bands ; caudal appendage bearing on each side, at its base, a hemispherical projection, and clothed with a bunch of long hairs, behind and on each side a loose dorsal bunch of hairs, which join a ventral and longitudinal band of hairs, the two ventral bands unite in front of another sub-caudal appendage, which is chitinous, blackish, blunt and twice as long as wide. *Ventral surface* (VII, *a*) reddish brown, almost flat, with punctuations shallow, scattered, clothed with short hairs. Genital pore covered with a retrograde valve, situated opposite the first inter-coxal space ; anus at the anterior summit of a deep, median fossa, limited on each side, by an adanal shield, in the form of a sharp spine, long, chitinous, free in its whole extent ; the two spines unite on the median line at the anterior edge of the anus, forming thus a fork with two teeth, which is prolonged in front by an irregular, smooth plate to the level of the last inter-coxal space ; stigmatic plates short, oval, edges brownish, stigmatic orifice nearly central, the whitish background is formed of numerous granulations hemispherical and shining. *Rostrum* (VII, *c*), with dorsal base, wider than long, without lateral projections, wider in front than behind, the posterior angles indicated by two small conical projections ; mandibles (VII, *d*) with inner apophysis conical, sub-terminal, transverse, with base large, tip bifid ; outer apophysis with two teeth, the terminal one small ; hypostome wide, a little longer than the palpi with eight rows of six to seven teeth, preceded by a surface covered with very numerous and very small denticles ; palpi very short, thick, the first article only visible on the ventral surface, in the form of a transverse band, the second at least as wide as long, rounded on the exterior, wider on the dorsal face, narrower at its base, provided with hairs on its external dorsal edge ; the third almost twice as wide as long, forming exteriorly toward the middle of its exterior border a short point ; the fourth small, short, cylindro-conical, sub-terminal. *Legs* strong, thick, increasing from the first to the fourth, coxae contiguous, sub-triangular ; coxae I, II, and III provided with a very small spine near the internal angle of coxae I ; tarsi sub-conical, similar, increasing a little from I to IV, a false articulation, distal in I, proximal in II, III, and IV ; a strong terminal spur, long, preceded by a spine on the ventral side, and bearing at its base, on the dorsal border, an ambulacre with a disc as long as the spur, and terminated by two weak claws ; all the articles very chitinous, dark brown on their distal and ventral border ; with the fourth pair the second article is sub-cylindrical, the third strongly dilated exteriorly, is thus rendered rectangular, wider than long, flattened

from one side to the other, and its false articulation proximal, and indicated by a small disc of insertion; the fourth dilated the same, irregularly hexagonal; the fifth, less dilated, seems inserted on the preceding by the middle of the ventral border. This disposition produces on the dorsal border of the three legs deep sinuses, which correspond in the second, third, and fourth articulations; the third pair shows a similar dilation, but less pronounced in the same articles; the third and the fourth sub-rectangular, but a little longer than wide; the fifth approaches the ordinary form, and the articular sinuses are shallower than in the third pair; this is true in the first and second pairs, but more feebly developed.

*Female*.—*Body* elliptical or oval (a little wider in front than behind), generally a little constricted in the middle (at the level of the stigmatic plates), often attaining 16 mm. in length by 10 mm. in width; of a yellowish grey tint (young) or deep brick red (engorged and in alcohol). *Dorsal shield* glabrous, very small, longer than wide (about 1.10 mm. by 0.92 mm.), emargination in front, for insertion of base of rostrum, lateral edges parallel, and a little convex at first, then curved, and converging from the region of the eyes to unite in a broad rounded angle; cervical grooves well marked, dividing the shield into three parts, the median at least twice as wide as the lateral; eyes relatively large, projecting, of the same colour as the shield toward the middle of its length, punctuations absent; colour reddish brown. For almost the whole of the length of the *dorsal surface* two longitudinal grooves, less marked in front, disappearing a little distance from the shield, and from the posterior border; between them, an uneven groove occupying more of the posterior half of the length of the body. On the *ventral surface*, genital pore small, very anterior, opposite coxae I; genital grooves commencing only at the level of coxae II; stigmatic plates in a short oval, with wide axis longitudinal, hairs very short, scattered over the surface of the body. *Rostrum* (VII, e) very short, the base more than twice as wide as long, sub-hexagonal, inserted in the shield by its posterior half, with sides convex, not angular; posterior angles not salient; porose areas elongated transversely; twice as wide as long, separated by an interval less than their length; mandibles resembling those of the male; hypostome resembling that of the male, but with eight to nine teeth in a row, with anterior denticles few in number; palpi similar to those of the male, longer, the third article less angular on the exterior. *Legs* very different to those of the male, and conforming to those of *annulatus*, but thicker, with articles deep brown at their distal extremities; coxae sub-triangular, rounded at the internal tip; a very small spine toward the middle of the posterior border of coxae I; articles II and III swollen at their distal extremities; tarsi long, terminated by a long spine, and relatively slender; preceded by a small spine on the ventral side, and bearing at its base on the dorsal side an ambulacre, with a disc resembling that of the male.

*Nymph*.—*Body* 2 to 2.5 mm. long; greyish; cordiform (wide in front, narrow behind); *shield* as wide as long, pentagonal. *Legs* cylindrical, with the articles short and swollen at the distal extremity; tarsi short.

*Hosts*.—Horses, and sometimes cattle.

*Habitat*.—The highland districts of Cape Colony, Basutoland, and probably Orange River Colony, Central Africa.



This tick is spoken of by Lounsbury in 1905 as *Rhipicephalus* (B) *sp.*. He says it occurs in Cape Colony in the high inland districts, most probably because more horses are found there, and not on account of the climate. I have had it sent in also from Basutoland. It is found principally upon horses, and cattle are seldom infested, even when horses are very scarce. Horses often become very badly covered with these ticks when they run over the veld in the winter time. Very few are found during the summer months. From adults to hatching of larvae, in Capetown, took 186 to 201 days, and is probably longer on the veld. Lounsbury says that development cannot be forced in an incubator. There is probably only one generation in a year.

GENUS RHIPICEPHALUS. KOCH.

*Acarus* (ex. p.), Linnaeus (1758).

*Ixodes* (ex. p.), Latreille (1795).

*Rhipicephalus*, Koch (1844).

*Phaulixodes* Berlese (1889).

*Boophilus*, Curtice (1890).

*Rhipicephalus*, Koch, (Neumann, 1897).

Eyes present. Base of rostrum wider than long, hexagonal on the dorsal surface, forming on each side a prominent lateral angle. Palpi short, wide, the third article prolonged on the ventral by a short retrograde point; the first article by a lobe on the inner side, sometimes not very prominent, and slightly retrograde. Coxae I ordinarily with two strong teeth. Stigmatic plates comma-shaped, with a short tail in the female, and a long one in the male; males provided usually with two pairs of ventral plates, in the region of the anus and known as (1) anal plates, next to the anus, and (2) accessory anal plates, smaller in size and situated laterally of the anal plates. Males usually with a caudal prolongation on the posterior margin of the body.

This is one of the most important groups of ticks because of the role which so many of its species play in the transmission of diseases. It is especially an African genus, fully three-quarters of the species referred to it being found in Africa.

It presents the most difficulties to the student of the *Ixodidae*. Many of the species seem almost impossible to separate, especially where one has a large series of specimens with all stages of variations. The immature stages are very similar, and even the most careful study may fail to distinguish the species to which they belong.

The females are more difficult to distinguish than the males. The only characters which are easy to use are those of the shield and base of rostrum. With the males the characters of the shield, base of rostrum, and anal plates are of most use.

The males differ from the males of other genera by the fact that the body is much more slender, and after feeding a few days it usually swells.

and projects slightly beyond the shield on the lateral and posterior margins, the caudal prolongation also usually appearing at this time.

I have been unable to obtain or rear the immature stages of each species, so that the study of these stages is incomplete.

The following discussion, together with the keys, may serve to make the distinctions between the species more apparent. The drawings in the plates are made from what seemed typical specimens, and will probably assist most in studying this difficult genus.

MALES OF RHIPICEPHALUS. (See *Plates VIII and IX.*)

Among the males, *evertsi* is probably the most readily recognised, because of its shagreened shield and also its saffron-coloured legs. Besides this the eyes are spherical and in orbits (*VIII, a*).

*R. oculatus* resembles it closely in the matter of the eyes, but although the punctuations on the shield are numerous, fine, and almost equal, they do not coalesce so as to give a shagreened appearance (*VIII, b*).

In *capensis* the shield is shagreened, but here the eyes are not spherical, but flattened on the lateral margins (*VIII, c*).

*R. sanguineus* is the type species of the genus. The punctuating of the dorsal shield is here very distinct; the punctures are unequal in size, the smaller ones, more numerous, do not coalesce, but are regularly distributed; the larger punctuations are fewer in number and are arranged in more or less regular fashion. There is a narrow posterior groove, with a large, oval, shallow pit on each side of it, with further forward two wider, smooth impressions; the caudal prolongation is very short or may be wanting (*VIII, e*). Another species known as *punctatissimus* was originally described by Gerstäcker, and differed from *sanguineus* in the punctures being distributed more irregularly on the shield. Later studies made by Dönitz seem to show that this species is synonymous with *sanguineus* or at most only a variety of the latter species.

*R. appendiculatus*.—This species, together with *bursa*, have caused considerable confusion; *appendiculatus* is easily recognisable by the elongate, slender caudal prolongation, but where this is not present the punctuation is typical (*VIII, d*). The large punctuations are mostly confined to the anterior end of the shield, but in a large area on each side at about the middle of the length of the shield the punctuations are very scarce and very superficial. There is not so much difference in the size between the large and small punctuations as is the case with *sanguineus* and other species of *Rhipicephalus*. The anal plates are also characteristic, both ends are pointed quite sharply, and the accessory anal plates are only indicated or lacking.

*R. bursa* might be easily confused with *appendiculatus*, were it not for the anal plates, which are very broad, and not narrow and slender as in *appendiculatus*, there are also very small and slender accessory plates present. The punctuations of the dorsal shield are more even in size and distributed evenly over all its extent, a few large punctuations do exist, but they are situated near the margins and anterior end (*VIII, h*). The punctuations bring it near to *capensis*, which is, however, shagreened.

*R. simus* is quickly recognised. It is larger than *appendiculatus*, and the shield is almost black in colour and polished so as to shine

brightly. The grooves on the shield are almost obsolete, and the fine punctuations are very fine and superficial and few in number. The large punctuations are very large and distributed in four irregular longitudinal rows. These rows may vary in continuity, and the relative number and size of punctuations, both large and small, may vary considerably. The anal plates are triangular, with posterior edge rounded and inner edge concave (VIII, f).

*R. nitens* is considered by some workers as only a variety of *appendiculatus*. The punctuations on the dorsal shield are numerous, the small ones are very fine and superficial, but the large ones are confined to the margins and irregularly distributed in the anterior region. The anal plates are semi-lunate in shape and pointed at both ends.

*R. lunulatus* lies between *sanguineus* and *simus*. The males are smaller than *simus*, but almost equal to *sanguineus*. The small punctuations of the shield are larger than in either of these species, more numerous and evenly distributed over the whole surface. The large punctuations are most numerous in the anterior position, but four irregular lines extend longitudinally over the shield. The anal plates are triangular and concave on the posterior margin, forming two sharp teeth on posterior angles (VIII, g).

*R. duttoni* is very similar to *R. appendiculatus* and *R. lunulatus*. It differs from the former, however, in the body not projecting beyond the lateral margins of the dorsal shield; the fine punctuations are more evenly distributed over the surface of the shield, and larger than the fine punctuation of *appendiculatus*; the posterior angles of the base of the rostrum are more prominent than in *appendiculatus*. The anal plates are not spindle shaped, as in *appendiculatus*, but broadly triangular, with the inner angle of the base very prolonged and sharp. In *lunulatus* the two basilar angles are of about equal length and the plates are not so wide.

#### FEMALES OF RHIPICEPHALUS. (See Plate X.)

The females of this genus are much more difficult to distinguish than the males. The characters most used are the shields, as with the males, and the base of the rostrum.

Based on shape of shields, we may divide the species into two groups, (1) those with shields longer than wide, and (2) those with shields as wide or practically as wide as long. Class one includes *sanguineus*, with the doubtful species *punctatissimus* and *appendiculatus*, although the last one is not always apparently longer than wide. The remaining species come under class two. Dividing the species on the character of the eyes, we find that *evertsi* and *oculatus* have spherical eyes, situated in deep orbits, while the remaining species have flat unorbited eyes. In *evertsi* and *capensis* the punctuations on the shields are so numerous as to produce a shagreened effect, while the remainder of the species have the punctuations distinct and not coalescing.

*R. evertsi* is easily recognised from its broad oval shield, orbited eyes, and shagreened surface, as well as by its saffron-coloured legs (IX, a).

*R. oculatus* does not have the heart-shaped shield shagreened, but the eyes are orbited, setting it off at once as distinct from the other species (IX, b). The punctuations are mostly fine and distinct, with a few

very large ones in the median area and near the anterior margins, in this resembling *sanguineus*, but, unlike *sanguineus*, the shield is as wide as long.

*R. capensis* closely resembles *evertsi*, except that the eyes are flat, marginal grooves well developed, and a few large punctuations in the anterior part (IX, c).

*R. sanguineus* has a shield much longer than wide and very narrowly rounded behind. The eyes are situated near the posterior third of the length. The punctuations are mostly fine, and distant, on the whole surface of the shield. In the median area, the base of the marginal groove, and the marginal areas, are a few irregularly distributed very large punctuations (IX, e). The doubtful species *punctatissimus* is probably synonymous with *sanguineus*, as all the characters agree.

In *appendiculatus*, the shield is slightly longer than wide, but not so noticeably so as in *sanguineus*. The eyes are at about the middle of the length of the shield. The fine punctuations are larger than in *sanguineus*, and thickly distributed over all the surface, except in an area on each side near the eyes, where they are fewer in number. The large punctuations are mostly confined to the anterior and lateral portions of the shield. The porose areas on the base of the rostrum are separated by more than their diameter, thus separating them from *sanguineus*, where these porose areas are only about a diameter from each other (IX, d).

In *bursa* the dorsal shield is plainly as broad, or broader, than long, and hexagonal in outline. The punctures are equal, fairly fine, and evenly distributed over the whole surface; the porose areas in the rostrum are also separated by more than their diameter.

In *simus* the shield is as wide as long, with the sides rounded; in fact it often appears nearly circular in outline. The colour is nearly black, instead of dark brown, the usual colour, and shiny as in the male. The fine punctuations are numerous, evenly distributed, and usually very fine and superficial, often scarcely visible. The large punctuations are very large and few in number, situated in the median area, at the bottom of the marginal grooves and in the anterior portions of the marginal areas. Both the cervical and marginal grooves are continued to the posterior margin of the shield, where they meet (IX, f).

In *nilens* we find a shield similar to that of *appendiculatus*. It is oval in outline, but scarcely longer than wide; the marginal grooves are very superficial. The punctuations are unequal, the small ones numerous and superficial, while the large ones are situated in the median area and near the anterior edges, and not so scattered as in *appendiculatus*. Like *appendiculatus*, the porose areas of the rostrum are separated by more than their diameter.

The females of *lunulatus* resemble those of *simus*, as regards the dorsal shield, which is, however, slightly more elongate, of a brown colour, and with the fine punctuations slightly larger and more prominent. The large punctuations are smaller than in *simus*, and not so numerous. The cervical and marginal grooves are not so long, and do not meet at the posterior margin of the shield (IX, g).



*Males.*

## A. Eyes orbited.

B. Shield with punctuations so close as to produce a shagreened effect; shield deep brown in colour, body and legs saffron yellow .. .. . *evertsi*.

BB. Shield with punctuations distinct; legs and body not saffron coloured .. .. . *oculatus*.

## AA. Eyes flat.

B. Shield with punctuations numerous.

C. Punctuations unequal in size.

D. Punctuations all very apparent; caudal prolongation absent or short.

E. Anal plates with posterior edge straight or convex .. .. . *sanguineus*.

EE. Anal plates with posterior edge concave.

F. Anal plates with a single inner prolongation .. .. . *duttoni*.

FF. Anal plates with two posterior prolongations .. .. . *lunulatus*.

DD. Punctuations mostly very fine; large ones in anterior and marginal areas.

E. Anal plates triangular, pointed at both ends; caudal tail twice as long as wide

*appendiculatus*.

EE. Anal plates semi-lunate in outline .. *nitens*.

CC. Punctuations equal or almost equal.

D. Punctuations distant but numerous, fine, covering all the shield .. .. . *bursa*.

DD. Punctuations contiguous in places, making the shield shagreened.. .. . *capensis*.

BB. Punctuations on shield not very numerous, but large; usually arranged in fairly regular longitudinal lines; fine punctuations may be present, but usually invisible .. *simus*.

*Females.*

## A. Eyes orbited.

B. Shield short, oval; punctuations coalescing so as to make surface shagreened; legs saffron yellow in colour .. *evertsi*.

BB. Shield elongate, oval; punctuations numerous, but not coalescing; legs not saffron coloured. .. *oculatus*.

## AA. Eyes flat.

B. Shield oval, longer than wide, punctuations on shield unequal, numerous .. .. . *sanguineus*.

BB. Shield short, oval, or as wide as long.

C. Shield shagreened except on the margin .. *capensis*.

CC. Shield with punctuations distinct.

D. Punctuations equal or nearly so, thick and close, but not coalescing .. .. . *bursa*.

DD. Punctuations unequal in size.

*E.* Fine punctuations scarcely visible, large punctuations very large and few in number  
*simus.*

*EE.* Fine punctuations very apparent.

*F.* Large punctuations scattered  
*appendiculatus.*

*FF.* Large punctuations near lateral anterior margins and in middle area .. *nitens.*

#### *Nymphs.*

*A.* Eyes hemispherical ; base of rostrum with sides rounded  
*evertsi.*

*AA.* Eyes flat ; base of rostrum with lateral edge produced into a point.

*B.* Base of rostrum with lateral angles short ; cervical grooves of shield nearly reaching posterior margin ; marginal grooves present, postero-lateral margin of shield concave  
*appendiculatus.*

*BB.* Base of rostrum with lateral angles very long and sharp ; palpi very slender and conical at tips ; cervical grooves short ; marginal grooves lacking ; shield quadrangular, with posterior margin convex. .. .. *simus.*

#### *Larvae.*

*A.* Eyes hemispherical ; shield covers all of anterior portion of body.  
*evertsi.*

*AA.* Eyes flat ; shield allows a portion of the body to show along the antero-lateral margin.

*B.* Base of rostrum with lateral edges rounded ; palpi moderately long .. .. *appendiculatus.*

*BB.* Base of rostrum with lateral edges produced into very long sharp points ; palpi long and slender and sharply pointed at the tip .. .. *simus.*

#### *Eggs.*

*A.* Dark brown in colour .. .. *evertsi.*

*AA.* Light brown in colour .. .. *appendiculatus, simus.*

### RHIPICEPHALUS EVERTSI. NEUMANN.

#### THE RED TICK.

*Rhipicephalus evertsi*, Neumann (1897).

*Plate VIII*, figures *a, i, k* ; *Plate IX*, figure *a* ; *Plate X*, figure *a* ;  
*Plate XI*, *a, e.*

*Male*.—*Body* short oval, widely rounded behind ; 5 to 6 mm. long by 3 to 4 mm. wide, widest at the level of coxae IV ; colour saffron yellow, except the shield and rostrum, which are dark chestnut brown. *Dorsal shield* (*VIII, a*) does not cover all the dorsal surface, but allows a margin of the body to be exposed on the sides and posterior end : convex, shining, punctuations numerous and contiguous, or almost so, making the

shield shagreened; cervical grooves concave outward, prolonged to near the middle of the shield; lateral grooves deep, not passing beyond the first festoon, punctuations on the lateral margin not contiguous, but distinct; three longitudinal grooves in the posterior portion; festoons short, with punctuations distinct, continued on the exposed portion of the body; eyes small, reddish brown in colour; spherical in orbits. *Ventral surface* glabrous, with short hairs, reddish yellow in colour; sexual orifice opposite the anterior edge of coxae II: anal plates triangular (*IA, a*), posterior edge rounded, reddish brown in colour, punctuate, with or without short hairs; a very short spine opposite the centre of the eyes; festoons faintly marked, median festoon often prolonged into a short point. Stigmatic plates (*VIII, i*) reddish brown in colour, comma-shaped, with a postero-dorsal prolongation. *Rostrum* reddish brown in colour; base wider than long, bearing punctures near its posterior margin, which is straight; lateral angles projecting sharply near anterior third of length; mandibles (*AI, i*) with process of inner apophysis of digit conical, divided into two teeth on its outer edge; outer apophysis bears two teeth; the lower one stronger; hypostome with six rows of teeth; palpi longer than wide; article I with a fringe of hairs on its medio-ventral margin; article II wider than long with a row of hairs on the corresponding margin; article III wider than long. *Legs* saffron coloured, of medium length; coxae I produced into a point anteriorly, which may be seen from the dorsal surface, posterior margin divided into two large teeth; the other coxae each with two short teeth on their posterior margins. *Tarsi* relatively long, two terminal, consecutive spines, except on tarsi I; the caruncle passing slightly beyond the middle of the claws.

*Female*.—*Body* oval; deep chestnut brown in colour; often with reddish spots on fully engorged specimens; may reach a length of 14 mm. by a width of 10 mm., and a thickness of 8 mm. *Shield* (*X, a*) short oval in shape; sides slightly sinuous, 1.9 m.m. by 1.6 mm. wide; blackish brown in colour, shiny; surface entirely shagreened; cervical grooves extending to the posterior quarter of the shield; no marginal groove; eyes hemispherical, small, shiny, reddish brown in colour, near the middle of the length; in orbits. *Dorsal surface* of abdomen, in young specimen, bears a deep lateral groove, which extends to the antepenultimate festoon; punctuations large, except near the shield, in the bottom of each a very small white hair; four short anterior grooves and three long posterior ones; festoons well marked; when engorged only indications of the longitudinal grooves and the festoons persist. *Ventral surface* smooth with fine punctuations, bearing small whitish hairs; sexual orifice small, opposite first intercoxal space; sexual grooves extend to posterior margin; anus rather anterior. *Rostrum* reddish brown in colour; base wider than long, posterior angles scarcely noticeable; porose areas deep, elongate; mandibles with process of inner apophysis of digit tridentate, middle tooth longest, outer apophysis with three teeth, posterior the strongest; hypostome with six rows of teeth; palpi elongate; article II longer than wide; article III only slightly longer than wide; a fringe of stout hairs on the medio-ventral margin of articles I and II. *Legs* saffron coloured, longer than those of the male; coxae small; coxae I deeply bidentate; coxae II, III, and IV each with two small teeth on their posterior edges; tarsi longer than those of the male, spines of tarsi II, III, and IV not so strong as in the male; caruncles similar to those of male.

*Nymph.*—*Body* (unengorged) elongate, elliptical; reddish brown in colour; length 1.5 mm. by 1 mm. wide. *Shield* covers anterior half of body. When engorged, body oval, widely rounded, slightly wider in front than behind; length 4.5 mm. by 3 mm. wide; colour bright bluish, lighter on margins. *Shield* pentagonal (*XI a*); longer than wide, well rounded behind; deep brown in colour; lateral angles very posterior; cervical grooves nearly straight, deep, reaching almost to the posterior margin; eyes hemispherical, dark coloured. *Dorsal surface* with numerous unequal, deep and irregularly distributed pits, each with a minute whitish hair; two anterior grooves very divergent and slightly concave outward, sometimes these grooves are doubled by a second groove which is not continuous throughout its extent; three posterior grooves one median and faintly marked, laterals shorter and slightly divergent posteriorly. *Ventral surface* sometimes with whitish hairs; punctured as on dorsal surface; ano-marginal groove distinct and reaching to the posterior margin; genital grooves widely divergent behind coxae IV; stigmatic plates whitish, nearly circular; anus near posterior third of length. *Rostrum* (*XI, a*) short; base much wider than long; posterior edge straight; sides rounded; hypostome with four rows of teeth; mandibles with inner apophysis bearing a tridentate process, outer apophysis with three teeth, the upper of which is very small; palpi elongate, cylindrical, article I very short, article II at least twice as long as broad, article III only slightly longer than broad. *Legs* slender; reddish brown in colour; coxae each bear two blunt, almost inconspicuous teeth on their posterior margins, those of coxae I are longer and sharper than those on the remaining coxae; tarsi elongate, no spurs.

*Larva.*—*Body*, when unengorged, elongate, elliptical, widest near middle; well rounded behind; length 0.5 mm., width about 0.3 mm.; colour light yellowish; shield darker coloured and covering anterior half of body. When engorged, body is elongate, elliptical, sides nearly parallel; length 1.2 mm. by 0.6 mm. wide; colour deep brownish blue. *Shield* as wide as long; widely rounded behind; colour light reddish brown; shagreened; cervical grooves deep anteriorly then shallow, extending two-thirds of the length of the shield; eyes small, hemispherical, dark coloured. *Dorsal surface* (*XI, e*) with three longitudinal grooves. *Ventral surface* (*XI, e*), with anus near posterior third; eleven festoons, distinctly marked; stigmatic openings in four pairs, one behind each coxa and a fourth pair in the posterior portion of the body, not far from the margin. *Rostrum* short; base wider than long; posterior margin concave; sides rounded; palpi short and thick, article I very short, article II twice as long as wide, article III as wide as long; hypostome with four rows of teeth; mandibles with process of inner apophysis tridentate; outer apophysis tridentate, upper tooth very small and sub-terminal. *Legs* slender; coxae with no teeth; tarsi elongate.

*Eggs.*—Dark brown in colour; surface shiny; elliptical in outline; length 0.5 mm. by 0.3 mm. in width.

*Hosts.*—The different domestic animals, ox, horse, ass, mule, sheep, dog, giraffe, eland, reed buck.

*Habitat.*—South Africa: Cape Colony, Transvaal, Natal, Rhodesia, German East Africa, tropical Africa, German South-West Africa, Mozambique.



This tick has been found to be concerned to some extent in the transmission of East Coast fever; it also transmits billary fever of the horse, mule, and donkey. It is able to withstand very dry and desert conditions, and is found even in the Karroo. Unlike most other ticks, it passes its first molt on the host, and the second off the host; that is, it visits two hosts during its life-cycle instead of three.

## RHIPICEPHALUS OCULATUS. NEUMANN.

### THE EYED TICK.

*Rhipicephalus oculatus*, Neumann (1901).

*Plate VIII*, figure *b*; *Plate IX*, figure *b*; *Plate X*, figure *c*.

*Male*.—*Body* narrow, regularly widened from front to rear; 3 mm. long (rostrum included). *Shield* (*VIII*, *b*) reddish brown in colour; covers all of the dorsal surface; cervical grooves long, very divergent; lateral grooves deep, commencing at a little distance from the eyes, stopping at the outer festoon; a median posterior groove; festoons short; punctuations numerous, fine, sub-equal, distinct and not coalescing; eyes small, hemispherical, shiny, in an orbit. *Ventral surface* brownish in colour; anal plates elongate (*IX*, *b*) triangular, inner edge longer than outer edge; secondary plates weak, spinniform; no caudal prolongation; stigmatic plates elliptical, dark coloured, very long caudal prolongation, extending in a postero-dorsal direction; sexual opening opposite coxae II. *Rostrum* with base wider than long; lateral angles near the anterior third of the length; the posterior angles prominent; a line of punctuations parallel to the posterior margin; mandibles with process of inner apophysis transverse, bidentate on outer edge, outer apophysis with two teeth, terminal one weak, basilar tooth strong; hypostome with six rows of teeth; palpi short and stout, article I and II prolonged backward on their ventral surfaces, all three articles having a fringe of hairs on their medio-ventral edges. *Legs* slender; coxae I bidentate; coxae II, III, and IV, each with two teeth on their posterior margins; tarsi II, III, and IV terminate by two consecutive spurs.

*Female*.—*Body* of variable length. *Shield* elongate, oval (*X*, *c*); longer than wide; dark brown in colour; cervical grooves extending to the posterior third of the length; lateral grooves well developed, reaching the posterior margin; punctuations mostly small, sub-equal, occasionally coalescing, a very few larger ones in the median and lateral areas; eyes small, shiny, hemispherical, in orbits, behind the middle of the length of the shield. *Dorsal surface* of body with four anterior grooves and three posterior grooves. *Ventral surface*: stigmatic plates oval, with a posterior dorsal projection; anus near posterior third; sexual opening opposite first intercoxal space; festoons indistinct; *Rostrum* like that of male; outer apophysis of mandibles with three teeth. *Legs* slender as in male.

*Hosts*.—Cattle, *Lepus* *sp.* (Damaraland).

*Habitat*.—Damaraland, Transvaal, German East Africa.

## RHIPICEPHALUS CAPENSIS. KOCH.

## THE CAPE BROWN TICK.

*Rhipicephalus capensis* (Koch, 1844, 1847).*Rhipicephalus capensis*, Koch (Neumann, 1897).*Plate VIII*, figure *c*; *Plate IX*, figure *c*; *Plate X*, figure *b*.

*Male*.—*Body* oval, widely rounded behind, in which part it is three times as wide as in front; length 3 to 5 mm. (including rostrum), width 1.75 to 3.0 mm. *Dorsal shield* (*III, c*) a little convex, shining, dark chestnut brown in colour, covered with contiguous punctuations, which give it a shagreened appearance; a few large punctuations in anterior portion; cervical grooves deep anteriorly, extending to the level of the eyes, which are flat, large, and pale yellow; lateral groove wide, deep, close to the margin, extending from the eyes to the separation of the two extreme festoons; lateral margin also shagreened; festoons distinct, shagreened, extreme festoons short, median ones elongate. *Ventral surface* glabrous, yellowish; sexual orifice opposite the middle of coxae II, followed by a whitish, strap-like appendage; sexual grooves parallel; anus opposite the middle of the stigmatic plates; anal plates (*IX, c*) almost isosceles triangles, base rounded, dark brown in colour, slightly punctured; accessory anal plates elongate and narrow, half as long as the anal plates; festoons very plainly marked, each with a transverse spot of dark chestnut colour; stigmatic plates large, whitish, elongate, comma-shaped. *Rostrum* dark brown in colour; base almost as long as wide; shagreened in the middle; angles prominent; palpi longer than wide; article II wider than long; a row of long stout hairs on the ventro-median margins of article II and III. *Legs* dark brown, strong; coxae typical, coxae II, III, and IV, each with two short teeth on their posterior margins; coxae I with two very long sharp teeth; tarsi short, two consecutive spurs, except on tarsi I.

*Female*.—*Body* elongate, oval; a little wider behind than in front; 5 mm. long by 2.7 mm. wide. *Shield* (*X, b*) almost as wide as long; sides rounded; reaches the middle of the body in unengorged specimens; dark chestnut brown in colour; punctuations confluent making surface shagreened, except on the lateral margins; cervical grooves reach almost to the middle of the shield; marginal grooves reach to the posterior margin; eyes flat, shiny, pale yellow in colour, a little behind the middle of the length of the shield. *Dorsal surface*, dark brown in colour, glabrous, coarsely shagreened by undulating, irregular transverse folds, crossing two short longitudinal grooves and three long posterior grooves; marginal groove well marked, as also the festoons, which are separated by slightly sinuous grooves. *Ventral surface* shagreened like the dorsal surface, and of same colour; festoons plain, elongate. *Rostrum* with base wider than long; posterior angles only slightly projecting; hypostome with six rows of teeth; palpi elongate, article II as wide as long, dorso-median margin longer than the dorso-lateral margin; article III as wide as long; a fringe of stout hairs on the ventro-median margin of articles I and II. *Legs* more slender than in the male; otherwise similar to those of the male.

*Hosts*.—Cattle, goat, dog, horse, *Varanus saurus*.*Habitat*.—Namaqualand, Cape Colony, Transvaal.

This tick has also been found to be concerned in the transmission of East Coast fever. It is not a very common tick in the Transvaal. In Cape Colony it extends for some distance into the Karroo.

# RHIPICEPHALUS SANGUINEUS. (LATREILLE.)

## THE EUROPEAN BROWN TICK.

*Ixodes sanguineus*, Latreille (1804).

*Ixode plombe*, Duges (1834).

*Ixodes duguessi*, Gervais (1844).

*Ixodes rufus*, Koch (1844).

*Rhip. sanguineus*, Koch (1844).

*Rhip. limbatus*, Koch (1844, 1847).

*Rhip. siculus*, Koch (1844, 1877).

*Rhip. rubicundus*, Frauenfeld (1867).

*Rhip. stigmaticus*, Gerstäcker (1873).

*Rhip. beccarri*, Pavesi (1883).

*Phaulixodes rufus*, Berlese (1889).

*Rhip. sanguineus* (Latreille) (Neumann, 1897).

Plate VIII, figure *c*; Plate IX, figure *e*; Plate X, figures *e*, *k*.

*Male*.—*Body* regularly enlarged from front to rear, 3.35 mm. long by 1.55 mm. wide, often with a conical prolongation on the posterior end. *Shield* (VIII, *e*) reddish brown, covering all the dorsal surface except a narrow margin on the sides and posterior end: cervical grooves short; a short median groove in the posterior part of the shield on each side of which is a rounded pit; punctuations unequal, fine ones numerous on all the surface, large ones very large and more numerous in the anterior portion of the shield; marginal grooves well marked; eleven rectangular, posterior festoons; eyes pale coloured, situated at level of posterior margin of coxae II. *Rostrum* with base wide, lateral angles projecting sharply; palpi short and stout, articles I and II prolonged backward on their ventral surfaces; inner margin of article I projecting inward; articles I, II, and III each with a row of stout dental spines on the inner ventral margins; process of inner apophysis of mandible tridentate, outer apophysis bidentate, terminal tooth weak (X, *k*); hypostome with six rows of teeth, with about twelve teeth in a row. *Ventral surface* brownish in colour; on each side of anus is an elongate triangular plate, the tip of which extends to the level of coxae IV, the inner edge longer than the outer edge, base rounded (IX, *e*); a small spine outside of each of these plates; stigmatic plates comma-shaped. *Legs* slender, dark brown in colour, coxae I bidentate, coxae II, III, and IV each with two spines on their posterior margins; tarsi II, III, and IV terminated by two strong, consecutive spurs; all the articles with numerous stiff hairs.

*Female*.—*Body* elliptical, as wide in front as behind, often reaching a size of 11 mm. long by 7 mm. wide; reddish brown or yellowish in colour. *Dorsal shield* (X, *e*) very small, longer than wide (about 1.5 mm. long), lozenge oval in outline; truncate in front to receive

the base of the rostrum; punctuations unequal, a few large ones in median area and forming part of lateral grooves, but the greater part fine and distant from each other; eyes in the middle of the length or slightly posterior of middle; cervical grooves elongate, nearly reaching posterior margin; lateral grooves deep and almost meeting cervical grooves at posterior end. *Dorsal surface* glabrous or almost glabrous; in the young female, four anterior grooves, sometimes not well marked, three posterior grooves. *Ventral surface* glabrous; festoons slightly marked; stigmatic plates oval, with a short postero-dorsal prolongation. *Rostrum* with base wider than long, lateral angles large and sharp, giving it a width twice that of the posterior margin; porose areas large, elliptical, close together; palpi not so short and massive as in male, and not so angular on outer edge; the three articles bearing spines as in male; inner ventral margin of article I projecting inward; hypostome with six rows of teeth of about 12 teeth to a row; mandibles (*X*, *k*) with process of inner apophysis tridentate, but teeth not so pronounced as in male; outer apophysis tridentate, anterior tooth sub-terminal and small. *Legs* rather slender, deep brown in colour; coxae longer than wide, coxae II, III, and IV, with two small spines on posterior margins, as in male, but the outer spine is not so strong as in male; stiff hairs on all the articles; especially on dorsal and ventral margins of articles III to VI; tarsi II, III, and IV with only one ventral spur, proximal spur represented by a blunt tuberosity.

*Nymph.*—(*Phaulixodes rufus*.) *Body* elliptical, a little compressed, greyish, reddish brown or blackish, often 5 mm. in length. *Dorsal shield* very small, elongate pentagon, lateral margins almost straight, not diverging very much; surface irregularly reticulated; cervical grooves diverging only behind; eyes on lateral angles, near posterior third. *Dorsal surface* of abdomen with four anterior grooves, the outer ones shorter; three posterior grooves, the median straight and the outer ones curving outward. On the *ventral surface*, sexual pit, unperforated, opposite coxae II; sexual grooves well marked; ano-marginal groove long; stigmatic plates circular. *Rostrum* very short, base a little widened behind insertion of palpi. Mandibles almost like those of female; hypostome with two rows of teeth on each half; palpi a little valvate, with a few scattered hairs; articles a little prominent on the outer edges, article IV relatively long. *Legs* short, slender, coxae I with division not very deep; the others as in female; tarsi without spurs.

*Hosts.*—Especially the dog, but also cattle, sheep, cat, sometimes man, and the following wild animals of South Africa and other countries:—Lion, fox, genet, hare, hedgehog (*Erinaceus niger*), lynx, jackal, gazelle, dromedary, chamoise, tortoise, pangolin, *Olus ellipsiprymnus*, *Canis megalotis* (Egypt), *Strix ascalaphus* (Egypt), *Lepus ethiopicus* (Nubia and Abyssinia), *Vulpes persica* (Arabia).

*Habitat.*—France, Italy, Sicily, Corsica, Roumania, Egypt, Somaliland, Algeria, Abyssinia, Nubia, Beirut, German East Africa, Portuguese East Africa, Natal, Cape Colony, Transvaal, Madagascar, German South-West Africa, Cameroons, Togo, Congo, Senegal, Antigua, Arabia, Persia, India, Singapore, China, Phillipine Islands, Australia, Panama, French Guiana.

This tick is of very wide distribution over Europe, Africa, and Asia, even extending into Central America. It seems to be of fair occurrence in the Transvaal, but is confined mostly to the northern and eastern



portions. The commonest host in the Transvaal is the dog ; one specimen has been taken from the ringed pigeon, and, what is probably a nymph of *sanguineus*, from the striped mouse (*Aricanthis pumillio*) at Pretoria. Dönitz states that *sanguineus* transmits a disease of dogs in France.

### RHIPICEPHALUS LUNULATUS. NEUMANN.

*Rhipicephalus lunulatus*, Neumann (1907).

Plate VIII, figure *g* ; Plate IX, figure *g* ; Plate X, figure *g*.

*Male*.—*Body* a little wider behind and acuminate behind ; length 4 mm. (rostrum included), width 1.9 mm. near the posterior third. *Shield* (VIII, *g*) convex, shining, very dark brown, almost black in colour, without spots, showing a slight margin of the abdomen beyond the sides of the shield ; cervical grooves very short ; marginal grooves deep, occupied by large punctuations, commencing immediately behind the eyes and ending at the groove which separates the two extreme festoons ; punctuations large, distant, in irregular lines, one line on each side, a little inside of the marginal groove, forms its prolongation forward ; a few very fine punctuations in front, almost obsolete ; eyes flat, yellowish, large, marginal. *Ventral surface* reddish brown, punctuated with a few very short hairs ; anus near the anterior quarter of the anal plates (IX, *g*) ; the latter elongate, triangular, the inner margin concave, the outer margin convex, the posterior margin divided into two unequal lobes, the outer one of which is spine shaped ; the outer pair of anal plates projecting, spiniform ; no caudal prolongation ; stigmatic plates narrow, elongate comma-shaped, with the point recurved toward the dorsal surface. *Rostrum* 0.55 mm. long, dorsal surface of the base wider than long, lateral angles projecting, situated near the anterior quarter of the length, posterior angles not very prominent ; hypostome slightly spatulate, with six rows of teeth ; mandibles with process of inner apophysis elongate transversely and bidentate, outer apophysis bidentate ; palpi scarcely longer than wide, flat on the dorsal surface, the second article as long as the third and contracted into a point on its posterior-dorsal margin. *Legs* relatively strong. Coxae I with anterior point slightly visible from the dorsal surface, bears two very long spurs ; on the posterior margin of the other coxae, two wide, flat teeth ; tarsi medium in size, with terminal claws.

*Female*.—*Body* a wide ellipse in outline, length 8 mm. (including rostrum), width 6 mm., widely rounded at both extremities ; dark blue in colour. *Shield* (X, *g*) small ; dark brown in colour ; longer than wide or as wide as long ; widely rounded behind ; cervical grooves deep in anterior part, reaching posterior margin ; lateral grooves deep, set off by large punctuations ; nearly reaching posterior margin, punctuations small, evenly distributed, and well separated from one another, a few very large punctuations in median area, marginal grooves, and marginal ridges. *Rostrum* with base much wider than long ; posterior angles not very prominent ; lateral angles very prominent, porose areas small, circular, and separated by a diameter, numerous punctuations between them ; palpi typical ; hypostome with six rows of teeth ; mandibles with process of inner apophysis tridentate ; outer apophysis with three teeth. *Dorsal surface* glabrous, four anterior grooves and three posterior grooves. *Ventral surface* glabrous, numerous punctures and a few short whitish hairs ; sexual

opening opposite first intercoxal space ; stigmatic plates short, comma-shaped ; genital grooves extending to posterior margin, ano-marginal groove well marked ; festoons not very distinct. *Legs* slender, reddish brown in colour ; coxae II, III, and IV, each with two strong teeth on posterior margin ; coxae I, bidentate ; tarsi with two ventral spurs ; hairs on all the articles.

*Hosts*.—Dog, hedgehog (*Erinaceus frontalis*), horse.

*Habitat*.—Congo Free State, Transvaal.

This tick has only recently been described (Neumann, 1907) from the Congo. In the Transvaal it has only been taken in the Zoutpansberg district on dogs and hedgehogs.

### RHIPICEPHALUS DUTTONI. NEUMANN.

#### THE CONGO BROWN TICK.

*Rhipicephalus duttoni*, Neumann (1907).

*Male*.—*Body* narrow in front, broadest (1.85 mm.) a little posterior to the middle, length with rostrum 3.55 mm. *Dorsal shield* slightly convex, chestnut brown without spots, abdomen does not extend beyond its margins ; cervical grooves very broad, shallow, and form elongate depressions, contain no punctures and are prolonged posteriorly by a narrow superficial groove which extends beyond the middle point of the length ; marginal grooves broad, shallow, slightly and finely punctured, commencing almost immediately behind the eyes, and terminating in a groove which separates the last from the following festoon ; punctuations irregular, coarsest in front, fine and superficial over the remainder of the surface ; behind are three wide, shallow, unpunctured longitudinal grooves, the middle one the longest ; festoons longer than broad, slightly punctured, otherwise normal ; eyes flat, yellowish, large, marginal. *Ventral surface* reddish brown, convexed with rather long and abundant whitish hairs ; anus anterior of the middle of the length of the anal shields ; and shields shaped like a scalene triangle, the inner edges longest, forming a long inner posterior spine, rectilinear in the anterior half, outer edge slightly convex, posterior edge concave and bordered by a row of large punctuations ; adanal shields replaced by a prominent non-chitinous fold ; no caudal prolongation but a chitinous thickening on the median festoon ; stigmatic plates, whitish, narrow, comma-shaped. *Rostrum* with base almost twice as broad as long, lateral angles at about the middle of the length, posterior angles quite prominent ; hypostome slightly spatulate, with six rows of teeth ; palpi as broad as long, flattened dorsally, second segment scarcely longer than the third and retraced into a blunt point dorsally at its posterior border. *Legs* relatively strong ; coxae covered with long white hairs, anterior summit much prolonged and conspicuous on the dorsal surface as an auricle, with two very long spines ; on the posterior margins of the second and third coxae an external spine, flat, as broad as long, coxae IV divided on its posterior margin into two broad flat spines ; tarsi of medium size, with two terminal spines.

*Female*.—Unknown.

*Hosts*.—Cattle.

*Habitat*.—Congo, Northern Transvaal, Moçambique.

This tick seems to be very closely related to *R. appendiculatus* and *R. lunulatus*. It was originally described from the Congo, and only a very few specimens have been found in the Northern Transvaal.

## RHIPICEPHALUS APPENDICULATUS. NEUMANN.

## THE BROWN TICK.

*Rhipicephalus appendiculatus*, Neumann (1901).

*Plate VIII*, figure *d* ; *Plate IX*, figure *d* ; *Plate X*, figure *d* ;  
*Plate XI*, figures *b*, *d*, *g*, *i*, *k*.

*Male*.—Oval in outline, twice as wide at the posterior third as in front ; 3 to 4 mm. long ; reddish brown in colour. *Shield* (*VIII*, *d*) bordered by the body on the sides and behind ; of a dark brown colour ; a deep marginal groove limiting the last festoon ; cervical grooves very wide and short, but not very deep ; punctuations unequal, the small ones very numerous and superficial but quite apparent, the large ones rare and nearly all anterior, a few continue the marginal groove anteriorly from the eyes ; a space on each side near the middle of the length, where there are almost no punctuations ; posterior festoons twice as long as wide, except the extreme ones which are small and square or triangular ; all festoons continued into the margin of the body, the median is prolonged into a narrow tail twice as long as wide, truncate at tip ; in front of festoons are three longitudinal grooves, wide and short, the median a little the longest ; eyes flat, reddish in colour : dorsal porose areas near the middle of the length. *Ventral surface* almost glabrous, punctured, anal plates triangular (*IX*, *d*), inner edge longer than outer, giving them the appearance of being pointed at both ends ; punctuations deep ; accessory plates lacking or very small. *Rostrum* with base relatively long, the lateral angles near the anterior third of the length, posterior angles prominent ; several large punctuations on dorsal surface of base ; palpi short and thick, articles angular on their outer edges, articles I and II prolonged backward on the ventral side ; mandibles with process of inner apophysis transverse and bidentate on inner edge, outer apophysis with two teeth, the terminal tooth small. *Legs* with coxae II, III, and IV, each with two teeth on their posterior margins, legs IV flattened dorso-ventrally ; tarsi II, III, and IV terminated by two consecutive ventral spurs.

*Female*.—When young, body oval, flat, reddish brown in colour ; when engorged body becomes elliptical, swollen, thick and almost as wide at each end, often reaches a length of 11 mm. and a width of 7 mm. *Dorsal shield* (*X*, *d*) an oval lozenge in shape, with sides slightly sinuous, rounded at angles ; almost as wide as long ; marginal grooves well formed, but not very deep ; punctuations numerous, unequal, mostly very fine and superficial, the remainder large, few in number, and scattered ; punctuations less numerous in an area on each side at about the middle of the length of the shield ; eyes large at the middle of the length of the shield. Integument of *dorsal surface* ordinarily provided with thinly distributed hairs, more abundant on the ventral surface ; when young, numerous punctuations on the dorsal surface ; a marginal groove on each side ; three longitudinal grooves ; eleven quadrangular posterior festoons ; integument often so thin as to allow ramifications of the intestines to show through when fully engorged ; two anterior and three posterior grooves ; dorsal porose areas in the anterior half of the length of the body, stigmatic plates oval, with a short postero-dorsal prolongation. *Rostrum* with base widened into prominent angles ; palpi comparatively smaller than those of the male, but more elongate ; first three articles bear three projections on their inner



ventral edges, as well as a row of stout spines, somewhat dentate ; the outer edge of article I strongly constricted, producing an apparent constriction of the rostrum at the base of the palpi ; porose areas of medium size, ovate in outline, and separated by more than their diameters ; hypostome with six rows of teeth, each row consisting of about 12 teeth ; mandibles (*XI, k*) with process of inner apophysis tridentate, outer apophysis tridentate, terminal tooth small and sub-ventral. *Legs* slender, dark brown in colour ; coxae longer than wide, coxae II, III, and IV each with two blunt teeth on their posterior margins ; stiff hairs on all the articles ; tarsi II, III, and IV each with two ventral spurs, the proximal one not so sharp.

*Nymph*.—Elliptical in outline ; when unengorged, 1.25 mm. long by 0.75 mm. wide ; when engorged, 4 mm. long by 2.25 mm. wide ; slightly wider in front than behind ; colour bluish. *Shield* (*XI, b*) small, dark brown in colour ; pentagonal in outline, deeply emarginate in front, antero-lateral edges straight and occupy fully two-thirds of the length of the shield ; posterior edges concave, but widely rounded in middle ; cervical grooves shallow, nearly straight, diverging slightly behind and nearly reaching the posterior margin ; lateral grooves very close to the margin, slightly concave, and reaching the posterior margin ; shield convex between the cervical grooves ; eyes at the lateral angles, small and shining ; shiny ; surface shiny and glabrous, with a few very large punctuations, mostly in the median area. *Dorsal surface* with numerous large papillae, distant from each other ; two anterior and three posterior grooves ; posterior festoons present. *Ventral surface* with papillae present only in posterior half ; genital grooves present and reaching almost to the posterior margin ; ano-marginal groove present ; stigmatic plates small, whitish, elliptical in outline. *Rostrum* (*XI, b*) light coloured, base wide and short, articulated by a slender neck ; lateral angles sharp ; palpi slender, articles elongate ; hypostome with four rows of teeth ; mandibles as in female. *Legs* slender, light coloured ; coxae I with a single median, posterior tooth, coxae II, III, and IV with two posterior teeth each (*XI, g*) ; tarsi elongate but thick.

*Larva*.—*Body* longer than wide ; widely rounded at both ends ; light reddish brown in colour ; length 0.75 mm., width 0.50 mm. ; when engorged, oval in outline, dark reddish or bluish in colour, 1.3 mm. long by 0.9 mm. wide. *Shield* as wide as long ; widely rounded behind ; antero-lateral edges very convex, allowing body to show for some distance before the lateral angle ; cervical grooves shallow ; eyes in lateral angles ; surface smooth, except for a few short spines. *Dorsal surface* (*XI, d*), when engorged, with two anterior and three posterior grooves ; festoons well marked. *Ventral surface* (*XI, d*) with genital grooves well marked ; ano-marginal groove deep ; festoons present ; stigmatic openings in four pairs, one behind each pair of coxae, and one pair near the posterior margin, in festoons next to the most anterior ones ; three pairs of spines between coxae ; several spines in posterior area. *Rostrum* with base wide and narrow, sides rounded ; palpi elongate, article I very short and almost invisible, articles II, III, and IV longer than wide ; article II constricted at base ; article III conical ; hypostome with four rows of teeth, about seven teeth in a row, and crenulations to the base ; mandibles as in female. *Legs* elongate but thick ; light coloured ; coxae I triangular, anterior end almost projecting beyond cervical angle of shield, one posterior tooth present ;



coxae II and III rectangular, coxae III with a small posterior tooth ; tarsi long and thick.

*Eggs*.—Light yellowish brown in colour ; elliptical in outline, surface smooth and shiny ; length 0.50 mm. by 0.30 mm. wide.

*Hosts*.—Cattle, horse, mule, sheep, goat, dog, rabbit, buffalo (*Bos caffer*), man.

*Habitat*.—Cape Colony, Transvaal, Rhodesia, Portuguese East Africa, Natal.

This tick is the principal agent in the transmission of the East Coast fever. It seems to be a general feeder on all warm-blooded animals, and is of very wide distribution over the whole of South Africa except in extremely dry places in the interior.

#### RHIPICEPHALUS BURSA. CANESTRINI AND FANZAGO.

*Rhipicephalus bursa*, Canestrini and Fanzago (1877-78).

*Rhipicephalus bilenus*, Pavesi (1883).

*Rhipicephalus bursa*, Canestrini and Fanzago (Neumann, 1897).

*Plate VIII*, figure *h* ; *Plate X*, figure *h*.

*Male*.—Length 4.5 mm. by 3 mm. wide, regularly widened from front to back, sometimes provided in the posterior extremity with a conical appendage. *Shield* (*VIII, h*) reddish brown, ordinarily covering all the dorsal surface, sprinkled with fine pores on all its extent, the largest on the borders, sometimes transparent and allowing the branches of the intestines to show through as black radiating lines ; cervical grooves short ; a short median groove in posterior portion, on each side of which are two rounded pits ; posterior margin divided into eleven rectangular festoons ; eyes pale, situated at the level of the posterior margin of coxae II. *Ventral surface* brownish red ; covered with fine hairs ; on each side of the anus a triangular plate, sides equal in length, base very wide, lateral of each of these plates, a straight spine, weak, often a little chitinous. *Rostrum* with base wider than long ; prominent lateral angles ; palpi rather short and thick and angular on their outer edges, articles I and II bearing on their inner ventral edges each a prominence, very marked on article I ; a row of stout spines, a little dentate on the inner ventral edges ; hypostome with six rows of teeth, each row composed of about 12 teeth ; mandibles with process of inner apophysis elongate transversely and tridentate, outer apophysis bidentate, terminal tooth very weak. *Legs* with coxae of their last pair, provided with two spines on their posterior margin, one in the middle, the other on the inner angle ; tarsi of the three last pairs terminated by two consecutive, well-developed claws.

*Female* (young).—*Body* oval, flat, reddish brown, 4 mm. long by 2 mm. wide ; (engorged) it is ovoid, swollen, thick, almost as wide at each end, and often attains a size of 17 mm. long by 9 mm. wide. *Dorsal shield* (*X, h*) an oval lozenge, with sides sinuous and rounded, almost as wide as long, hollowed by very numerous pores equal and evenly distributed ; eyes near the middle of the length, lateral grooves not well formed. *Dorsal integument* ordinarily provided with thinly distributed hairs, more abundant on the ventral surface ; when young, numerous punctuations on the dorsal surface ; a marginal groove on each side, three very deep grooves, the

laterals more prolonged in front, the median more prolonged behind, reaching almost to the posterior margin, which is divided into eleven quadrangular festoons, the integument often transparent, and allowing the ramifications of the intestines to show through as blackish, radiating lines. When fully engorged, two grooves in the anterior half, diverging behind and a little concave outward; three more in the middle posterior, of which a median, straight and two laterals, convex outward; stigmatic plates oval, with a prolongation, well marked, forming the postero-external angle. *Rostrum* with base widened into prominent points behind the insertion of the palpi, porose areas small, circular, and separated by more than their diameter; mandibles with process of inner apophysis elongate transversely and tridentate, outer apophysis tridentate, terminal tooth small and sub-ventral; hypostome a little spatulate, shorter than the palpi, provided with three rows of teeth on each half, almost equal in size, each row including about 12 teeth, of which the size diminishes a little from front backward; palpi short and strong, longer and more slender than in male, with sides not so angular, the first three articles bearing on their inner ventral edges three prominences, very marked on the first article; a row of stout spines, a little dentate, directed inward and forward, the outer edge of article 1 strongly constricted and concave, which produces a sort of constriction of the rostrum at the base of the palpi. *Legs* rather slender, dark brown; coxae longer than wide; those of the last three pairs provided with a small spine near the anterior external angle, and a blunt tuberosity on the external third of the posterior margin; stiff hairs on all the articles, especially on dorsal and ventral edges of third to last; tarsi of three last pairs terminated by a curved claw, preceded by a small blunt spine on the ventral edge.

*Hosts*.—The domestic animals, sheep, goats, cattle, horse, ass, dog; wild boar; hedgehog.

*Habitat*.—Southern France, Spain, Austria, Hungary, Italy, Corsica, Sardinia, Algeria, throughout West Africa and East Africa, Congo, Abyssinia, Cape Colony, Portuguese East Africa, Transvaal, Cuba, Haiti, Jamaica.

This tick has been frequently mistaken for the brown tick, which it very closely resembles. It is not of very common occurrence in the Transvaal, but seems to be more common in Northern Africa and Southern Europe.

### RHIPICEPHALUS NITENS. NEUMANN.

#### THE SHINY BROWN TICK.

*Rhipicephalus nitens*, Neumann (1904).

*Male*.—*Body* oval, narrow in front, wide behind; length 4 mm. (rostrum included), width 2.5 mm; general colour reddish yellow. *Shield* shining, covering all the dorsal surface; cervical grooves not very deep; eyes flat, yellowish; marginal grooves well marked, extending from the eye to the extreme festoon; festoons very apparent, the median one smaller than the neighbouring ones, or almost as large; punctuations numerous, unequal, superficial, mostly very fine, the large ones distributed along the borders and irregularly in the anterior region. Anal plates semi-lunate, the inner edge very concave, the outer edge

curved, the two extremities pointed and almost similar, punctuations numerous; no accessory plates nor caudal prolongations. *Rostrum* with base twice as wide as long, marked with two or three large punctuations; the posterior and lateral angles salient; palpi shorter than the base, articles II and III of the same length, wider than long; article I very visible on its dorsal surface; prolonged in a retrograde point on the ventral surface; a retrograde spine ventral and anterior on article III; hypostome with six rows of teeth. *Legs* medium, not punctured, conforming to type; coxae I with an interior prolongation visible from the dorsal surface.

*Female* (young).—*Body* of the same form, dimensions, and colours as in the male. *Shield* shining, oval-lozenge shaped, scarcely longer than wide; cervical grooves deep at their origin, scarcely marked and almost joining the posterior edge; marginal grooves united at their origin to the cervical grooves, very superficial, reaching almost the posterior margin; punctuations unequal, numerous, superficial, larger near the latero-anterior edges, and in the middle space; eyes large, flat, greenish yellow, situated near the middle of the length of the shield. *Dorsal surface* shining, glabrous, with superficial grooves; a few scattered punctuations; posterior festoons present; marginal groove passing from the shield to the posterior limit of the penultimate festoon. *Ventral surface* wrinkled, glabrous, a little punctured. *Rostrum* conforming to the type; the base more than twice as wide as long, with posterior angles not prominent; porose areas large, oval, divergent, separated by more than their width. *Legs* long, slender, with punctuations superficial; long hairs on the ventral surface of all the articles.

*Hosts*.—Cattle, wild Cape dog.

*Habitat*.—Cape Colony, Transvaal.

The habits of this tick are very similar to those of *R. appendiculatus*, of which it may be only a variety, but more specimens of the adults are found on the face of the host, and the nymphs seem to require longer for engorgement. It is not very common in the Transvaal.

## RHIPICEPHALUS SIMUS. KOCH.

### THE BLACK-PITTED TICK.

*Rhip. simus*, Koch (1844, 1847).

*Rhip. senegalensis*, Koch (1844, 1847).

*Rhip. praetextatus*, Gerstäcker (1873).

*Rhip. simus*, Koch (Neumann, 1897).

*Plate VIII*, figure *f*; *Plate IX*, figure *f*; *Plate X*, figures *f*, *i*; *Plate XI*, figures *c*, *f*, *h*.

*Male*.—*Body* oval, rounded behind, where it is twice as wide as in front; length 4 to 6 mm. (without rostrum) by 2.2 to 3.5 mm. wide. *Dorsal shield* (*VIII*, *f*) a little convex, shining, very dark coloured, almost black, glabrous, covering all the dorsal surface, except on the largest individuals when it is bordered in front and behind by a narrow margin of the body; cervical grooves deep, wide and short, a little divergent; eyes large, yellowish, marginal groove deep, extending from the eyes to the anterior edge of the penultimate or ante-penultimate festoon; festoons elongate,



separated by deep grooves, punctuations unequal, the large ones very large and deep, in the marginal grooves they may be contiguous or almost so, they prolong the marginal groove anteriorly beyond the eyes by two lines of punctures, the remainder are arranged in four more or less regular, longitudinal lines in the middle area of the shield, the small punctures are evenly distributed over the shield, but distant from each other, and usually so fine and shallow as to be almost invisible ; three posterior longitudinal grooves, very superficial ; dorsal porose areas present at anterior quarter of length of shield. *Ventral surface* yellowish or brownish in colour ; a few punctures ; glabrous or with thinly scattered hairs ; sexual orifice opposite the anterior edge of coxae II, sexual grooves diverging behind ; anus chestnut brown in colour, opposite the middle of the anal plates, which are triangular, with the inner edge concave, outer edge convex, and posterior edge convex (*IX, f*) ; a chitinous point forms the accessory anal plates ; eleven festoons present, the median one often prolonged in rectangular appendage ; stigmatic plates elongate, comma-shaped. *Rostrum* with base wider than long ; depressed in middle, the posterior angles prominent, lateral angles prominent at the anterior third of the length ; mandibles (*X, i*) with process of inner apophysis transverse and bidentate, outer apophysis bidentate, the anterior tooth small ; hypostome with six rows of teeth ; palpi longer than wide, article II longer than article III, its inner dorsal margin longer than the outer ; seven to nine hairs on the inner ventral margin ; article I also with a ventral projection ; article III wider than long. *Legs* reddish brown in colour, strong ; articles somewhat flattened dorso-ventrally ; tarsi short.

*Female*.—*Body* oval, a little wider behind than in front, may reach a length of 12 mm. by 8.5 mm. wide ; colour brownish, with lighter colour marking the furrows and festoons. *Shield* (*X, f*) scarcely or not longer than wide ; very dark, almost black in colour ; shining ; sides rounded or only slightly angular ; punctuations numerous, unequal, large punctuations in middle and marginal areas ; marginal grooves formed of a row of large pits, small pits evenly distributed, but usually so small and superficial as to be almost invisible ; cervical grooves almost reach the posterior margin where they nearly join the marginal grooves ; eyes shiny, flat, pale yellow, or often reddish in preserved specimens, a little behind the middle of the length of the shield. *Dorsal surface* of the abdomen lightly shagreened, in young individuals, punctuations large and occupied by whitish hairs ; dorsal porose areas just posterior of the shield ; marginal grooves at some distance from the margin, occupied by punctuations and hairs ; four anterior grooves, the outer ones close to the corresponding marginal grooves and very long ; three posterior grooves, the median longer ; festoons well marked, elongate ; when fully engorged the grooves and festoons are still faintly marked, usually by lines of a grey colour. *Ventral surface* of a uniform greyish or brownish colour, lighter than the dorsal surface ; glabrous or with a few hairs ; punctuations few and scattered ; posterior festoons very apparent ; sexual orifice opposite first inter-coxal space, sexual grooves diverging very rapidly behind coxae IV ; anal groove well marked ; ano-marginal groove present ; stigmatic plates short, comma-shaped, with prolongations very short. *Rostrum* with base shorter than in male ; mandibles (*X, i*) with process of inner apophysis bearing four teeth, outer apophysis tridentate ; hypostome as in male, but longer ; palpi similar to those of the male, only longer. *Legs* similar to those of the male, except that they are longer and more slender ; tarsi relatively long.



*Nymph*.—*Body* oval in outline, widely rounded behind, narrower in front; length (unengorged) 1.50 mm., width 1.0 mm.; colour light brown. *Shield* (XI, c) quadrangular, narrow in front, sides diverging posteriorly, posterior edge wide and convex, cervical emargination shallow; eyes at postero-lateral angles; cervical grooves short, wide and shallow; surface covered with numerous granulations; colour darker near the anterior end. *Dorsal surface* with two anterior and three posterior grooves, numerous fine granulations and a few small whitish hairs; festoons plainly marked. *Ventral surface* like dorsal; genital grooves reaching nearly to posterior margin; anal groove and ano-marginal groove well marked; festoons present; stigmatic plates elliptical in outline. *Rostrum* (XI, c) with base very wide and short; lateral angles very prolonged and sharp at anterior quarter of length; palpi slender, inserted on ventral surface; article I very small, article II twice as long as wide; article III not quite as long as article II; pit on medio-ventral surface bears article IV; hypostome slender, bears four rows of teeth with about seven teeth in a row; mandibles as in female. *Legs* long and slender; coxae all rectangular; coxae I prolonged anteriorly, each coxae with two posterior teeth (XI, h); tarsi long, swollen in centre.

*Larva*.—*Body* oval, much longer than wide; colour light yellowish brown, shield darker; 0.50 mm. wide by 0.66 mm. long; when engorged they reach a length of 1.50 mm. by 0.66 mm. wide; sides nearly parallel, widely rounded behind and narrowed in front; colour dark reddish or bluish. *Shield* covers a little more than the anterior third of the body when engorged; wider than long; posterior edge only slightly convex; lateral angles rounded, and not at margins of body; deeply emarginate in front to receive the rostrum; cervical grooves shallow, a few spines present. *Dorsal surface* (XI, f) with three to five grooves; festoons well marked. *Ventral surface* (XI, f) with genital grooves and posterior grooves normal; stigmatic openings in four pairs, one behind each pair of coxae, and the fourth in the fourth festoon from the central one; three pairs of spines between coxae; numerous spines in posterior portion. *Rostrum* on a long neck, base very wide and short, lateral angles very sharp; palpi inserted on ventral side of rostrum; palpi swollen in middle, constricted at base and conical at tip; article I very short, article II wider than long, swollen at middle; article III conical; article IV in a pit on the median ventral surface of article III; hypostome slender, four rows of teeth; mandibles as in female. *Legs* thick; coxae all quadrangular, coxae I with an anterior prolongation which projects beyond the shield and shows from dorsal surface; each coxae with a single posterior tooth; tarsi thick, conical at tip.

*Eggs*.—Light brown in colour, elliptical in outline; surface polished; length 0.5 mm., width 0.3 mm.

*Hosts*.—Dog, horse, hare, goats, sheep, rabbit, cattle, lion, bush-pig (*Potamochoerus choeropotamus*), hedgehog (*Erinaceus frontalis*), wild dog (*Lycena pictus*).

*Habitat*.—Turkestan, Borneo, German East Africa, Abyssinia, Sierra Leone, Transvaal, Cape Colony, Madagascar, Mozambique.

This tick assists in the transmission of East Coast fever. It seems to be confined to the more humid areas of South Africa. In Cape Colony it is confined more to the coastal belt of summer rainfall. In the Transvaal it seems to be most common in the bush and low veld, and more rare in the south-west high veld.

## GENUS AMBLYOMMA. KOCH.

*Ixodes* (ex. p.), Latreille (1795).*Amblyomma*, Koch (1844).*Amblyomma*, Koch (Neumann, 1899).

Eyes usually flat, slightly salient, sometimes hemispherical, shining, in a sub-marginal pit of the shield. Rostrum long; palpi valvate. Anal groove semi-circular, opening in front, uniting the sexual grooves; usually no median, ano-marginal groove. Dorsal shield often marked with designs in colour. No anal plates in the male. Stigmatic plates usually triangular, with rounded angles. Nearly always eleven posterior marginal festoons, at least in the male.

The presence of eyes separates this genus from *Ixodes* and *Aponomma*, and the absence of anal shields in the male from *Hyalomma*. Eyes are found in all degrees of development. Six forms are found in South Africa.

*Males.*

## A. Eyes hemispherical.

B. Coxae I divided into two blunt spines; coxae IV with one blunt spine; coxae II and III unarmed .. .. *variegatum*.

BB. Coxae all with two short spines .. .. *sylvaticum*.

## AA. Eyes flat.

B. Coxae I entire with a single long spine on posterior margin.

C. Ground colour light; anterior longitudinal line not joined by transverse line, and attenuated at posterior end, so as not to reach median transverse arched band.

*hebraeum*.

CC. Ground colour darker; anterior longitudinal lines of equal thickness, usually joined by transverse band, and reaching median transverse arched band.

*hebraeum eburneum*.

BB. Coxae I divided into two flat teeth.

C. Dorsal shield constricted at level of stigmatic plates; posterior festoons appearing like overlapping folds.

*crenatum*.

CC. Shield not constricted, festoons not folded

*marmoreum*.

*Females.*

## A. Eyes hemispherical.

B. Shield triangular; dark coloured .. .. *variegatum*.

BB. Shield heart-shaped; light coloured .. .. *sylvaticum*.

## AA. Eyes flat.

B. Coxae I with a long spine on posterior margin.

C. Anterior angles of dorsal shield and margin of cervical emargination dark coloured, like rest of shield; general colour of shield dark .. .. *hebraeum*.

CC. General colour of shield lighter; anterior angles and margin of cervical emargination light reddish grey in colour .. .. *hebraeum eburneum*.

- BB. Coxae I divided into two wide teeth. . . . .  
 C. Cervical grooves simple .. .. . *marmoreum*.  
 CC. Cervical grooves bifurcate .. .. . *crenatum*.

*Nymphs.*

- A. Metallic reflections on shield .. .. . *hebraeum*.  
 AA. No metallic reflections on shield.  
 B. Shield reddish brown .. .. . *variegatum*.  
 BB. Shield with a yellow bloom .. .. . *sylvaticum*.

*Larvae.*

- A. Body 0.7 mm. long (unengorged) .. .. . *variegatum*.  
 AA. Body 0.75 mm. long (unengorged) .. .. . *hebraeum*.

AMBLYOMMA HEBRAEUM. KOCH.

THE BONT TICK.

- Amblyomma hebraeum*, Koch (1844, 1847).  
*Amblyomma annulipes*, Koch (1844, 1847).  
*Ixodes poortmani*, Lucas (1850).  
*Ixodes poortmani*, Lucas, (Belval, 1861).  
*Amblyomma hassalli*, Marx and Neumann, (Neumann, 1899).  
*Amblyomma ebruneum*, Gerstäcker (1873).  
*Amblyomma ebruneum*, Gerstäcker, (Neumann, 1899).  
*Amblyomma hebraeum* (male), Koch, (Neumann, 1899).  
*Amblyomma annulipes*, Koch, (Neumann, 1899).  
*Amblyomma splendidum*, Giebel (1877).  
*Amblyomma splendidum*, Giebel, (Neumann, 1899).

Plate XII, figures a to h.

*Male*.—*Body* in a short oval, wider behind; length 5 mm. (rostrum not included), width 4 mm. *Dorsal shield* convex, covering all the upper surface; shining sulphur yellow, with spots and lines of a deep chestnut colour; cervical grooves short and wide; marginal grooves narrow, extending from the eyes to the posterior margin, where they form the anterior margin of the festoons, and are there wider than in the lateral portions; cervical emargination deep, almost square, a little wider than long, behind this emargination a sur-based triangular spot; from each anterior angle of the shield extend two dark coloured longitudinal parallel lines, the inner one covering the cervical groove; attenuated at its posterior end, and not reaching quite to an arched transverse line near the middle of the length of the shield, which passes laterally beyond the tips of these anterior longitudinal lines; near the end of the cervical grooves, the longitudinal lines swell laterally, forming a large dark spot; the second of the pair of lines, leaving the anterior angle of the shield, extends along the margin, becoming broad where it surrounds the eye, then constricted, and suddenly bending inwards: then extends longitudinally, until just below the extremity of transverse arched band, when it again extends outward to the margin of the outermost

festoon ; this line is of varying width, sometimes wide, and again constricted ; from its end, a dark line follows the lateral groove and the posterior end, forming the anterior margins of the festoons ; a median dark line extends from the centre festoon, anteriorly to near the arched line, swollen at its tip, but does not join the arched line ; on each side from the margin, a short dark line extends anteriorly ; the festoons light coloured except the two extreme ones ; lines of separation, chestnut coloured ; dorsal porose areas present on posterior margin of the transverse arched band ; punctuations equal, very fine, indicated by dark colour on the clear background ; eyes flat, large, shining, surrounded by the dark spot on the margin. *Ventral surface* dirty sulphur yellow, sometimes with greenish or brownish tinge, glabrous ; anus near posterior third, dark coloured ; festoons dark chestnut, except the two extreme ones on each side, the inner of which has a dark spot on the median margin ; five dark spots anterior of the chestnut coloured festoons ; an elongate one opposite the median festoon ; one opposite second festoon from median, which is circular, and an elongate one opposite extreme dark coloured festoons ; stigmatic plates, triangular with rounded angles prolonged outward and backward ; porcelain white, with orifice and border chestnut coloured. *Legs* long and thick, all the articles chestnut coloured, but ringed with lighter colour at their distal extremities, except the tarsi ; coxae I with a long blunt spine on the posterior margin, a similar spine on the posterior margin of coxae IV ; coxae II and III unarmed (*XII, h*) ; tarsi short and suddenly attenuated on dorsal extremity ; tarsi II, III, and IV armed with two stout consecutive spurs ; caruncle reaching scarcely to middle of length of claws. *Rostrum* (*XII, b*) 2 mm. long, narrow, base wider than long, sides rounded of a dark brown colour ; digit of mandible strongly armed (*XII, c*) ; outer apophysis with one large curved tooth leaving a very tiny tooth on its cephalic edge ; inner apophysis elongate, transverse bidentate ; hypostome spatulate ; tip bearing numerous denticles, then three longitudinal rows of teeth on each side of the anterior half, then four rows to middle of length, eight or nine teeth in each row, below these mere crenulations extending to base ; palpi valvate on inner side, with article II slightly curved, and almost three times as long as article III, which is as wide as long ; article IV small and conical, situated in a pit on the anterior ventral side of article III.

*Female*.—*Body* oblong, sides parallel, posterior margin widely rounded ; 16 mm. long (not including rostrum), 14 mm. wide. *Shield* cordiform, wide in front, narrow behind, postero-lateral edges nearly straight, as wide or nearly as wide as long ; cervical grooves well marked, very deep anteriorly, reaching almost to the posterior margin ; no marginal grooves ; general colour dark chestnut brown ; central area between cervical grooves of a light metallic bronze colour, darker anteriorly, two lighter spots in each lateral area, punctuations few and large, remainder of shield reticulated ; eyes shining, usually light coloured, but sometimes dark ; large punctuations anterior, and mostly outside the cervical grooves, in lateral areas. *Dorsal surface* (*XII, a*) dark brown, when not fully engorged, with a reddish tinge, especially anteriorly and around margins. When fully engorged, olive brown in colour, darker on edges and reddish on caudal end, lighter about shield and legs ; dorsal porose areas present at anterior quarter of length, dark coloured and raised from surface in fully engorged female ;



two longitudinal grooves in anterior half, parallel and extending from margin of shield where cervical grooves emerge; lateral of each of these, another groove curved inward, and broken in the middle; on posterior half three grooves, one median and extending anteriorly between the base of the anterior median grooves, two lateral grooves curved sharply outward below the middle of the length; between each of these and the median groove, near lateral margin, a very short groove, also a short groove on each side of median groove near posterior margin. *Ventral surface* same colour as dorsal; sexual orifice opposite first intercoxal space; anus near posterior third, ano-marginal groove present; two short grooves lateral of it, one on each side; genital grooves turning sharply outward, and posteriorly below coxae IV. In unengorged females caudal festoons are well marked on both surfaces; stigmatic plates triangular, wide, with a sharp short point extending laterally, but not as long as in male, white, with orifice and margin dark brown. *Rostrum* a little longer than that of the male, base as long as wide, extending anteriorly over the mandibles, making it appear almost triangular; sides rounded; porose areas large, oval; digit of mandibles with outer apophysis bearing three teeth, anterior tooth very tiny, other two very large, posterior largest (*XII, d*); inner apophysis tridentate; hypostome elongate, resembling that of male. *Legs* and coxae as in the male, except that the spine of coxae IV is almost obsolete; tarsi as in male.

*Nymph*.—Unengorged nymph 2 mm. long by 1.5 mm. wide, broadly oval in outline, wider behind, resembling male in general contour, colour deep chestnut brown, lighter on the edge; posterior festoons well marked. *Shield* (*XII, e*) cordiform; postero-lateral edges emarginate near centre; eyes shining, dark coloured, large and slightly orbited; cervical emargination very shallow; cervical grooves deep, converging at first, then sharply diverging to middle of postero-lateral margin; surface of shield covered with small reticulations evenly distributed over its whole extent; colour deep chestnut brown; median area lighter, and of a metallic reddish colour in posterior half, shading to almost yellow at cervical emargination; reddish at angles of emargination. *Ventral surface* same colour as dorsal; stigmatic plates large and circular, opening eccentric; anus at posterior third. *Rostrum* (*XII, e*) light dirty yellow, base triangular on dorsal surface, pentagonal on ventral surface; palpi as in adult, only article III is longer than wide; hypostome with only two rows of teeth on each half; digit of mandibles as in female. *Legs* small and slender, light yellowish in colour; coxae small, rectangular in outline; coxae I bidentate; coxae IV with a single blunt tooth.

*Larva* (unengorged).—*Body* a very short oval, widest behind coxae III, nearly circular with five to seven festoons plainly marked; length 0.75 mm., width 0.60 mm.; colour light reddish brown. *Shield* (*XII, g*) covering front half of body, heart shaped, resembling that of female, postero-lateral margins nearly straight, longer than antero-lateral; posterior angle well rounded, cervical emargination shallow and wide with a reddish metallic lustre, cervical grooves well marked, nearly straight, and reach to the posterior margins; eyes large and dark coloured, flat at lateral angles of shield. *Ventral surface* (*XII, f*) same colour as dorsal surface; a large spine anterior of each emargination of the ten caudal festoons; three pairs of spines on intercoxal area; one pair opposite postero-medial extremity of each pair of coxae; one pair of stigmatic openings between coxae I and II, another between II and

III, and one pair behind coxae III. *Legs* slender, light yellowish in colour; tarsi very long and slender; coxae I and II rectangular, coxae III triangular, with apex inward and widely rounded. Base of *rostrum* triangular on dorsal surface, with lateral angles sharp and prominent, pentagonal on ventral surface; palpi as in adult; hypostome with two rows of teeth on each half; digits of mandibles as in female.

*Larva* (engorged).—2 mm. long by 1.25 mm. wide, elongate, elliptical; sides parallel; broadly rounded at both extremities, colour dark chestnut brown, shield same colour as body.

*Eggs*.—Length 0.75 mm., width 0.30 mm; colour light chocolate brown, surface smooth and shining. Towards hatching time a white spot appears, indicating region of the anus of embryo.

*Hosts*.—Most warm-blooded animals, chiefly cattle, also horses, asses, dogs, sheep, goats, ostriches, fowls, several species of the antelope, man, and found rarely on hares. It has also been taken from the following wild animals:—Giraffe (*Camelopardalis giraffa*), the rhinoceros (*Rhinoceros lucerius*), *Lycaon pictus* in Cape Colony, *Boselaphus oreas* in British East Africa; buffalo, and elephant.

*Habitat*.—Cape Colony, Transvaal, Natal, Mozambique, German East Africa, British East Africa, Abyssinia, Congo.

This tick is most numerous along the southern and eastern coasts of South Africa, and is seldom found on the high veld, except in cattle recently brought up from the coast, although I have specimens collected at Pretoria, Middelburg, and Tzaneen Estate (Zoutpansberg). It transmits the disease known as heartwater to sheep and calves.

#### AMBLYOMMA HEBRAEUM, var. EBURNEUM. (GERSTACKER).

*Amblyomma eburneum*, Gerstäcker (1873).

*Amblyomma eburneum*, Gerstäcker (Neumann, 1899).

*Amblyomma hebraeum*, Koch, var. *eburneum* (Gerstäcker) (Neumann, 1904).

*Male* differs from the type as follows:—

General ground colour of shield darker; the anterior lateral bands are wide throughout their entire length, and not attenuated at their posterior ends; they also plainly join the median transverse arched band; the posterior median line also joins the central transverse arched band; a transverse band joins the anterior longitudinal bands, although this band may be obsolete or nearly so; all the dark coloured markings are much stronger and wider than in *hebraeum*; the rostrum is darker brown in colour.

*Female* differs from type as follows:—

In formaline or alcohol the body is of a brownish to yellowish green colour, while the type is always very dark, deep brown in colour. The shield bears in its posterior median area an irregularly rounded spot of reddish grey, which is continued anteriorly in the median area by a narrow longitudinal greyish line just inside each cervical groove; these lines may, however, be so wide as to become confluent; the anterior angles and the margin about the cervical emargination are also greyish in colour; the general colouration of the shield is of a lighter shade than in *hebraeum*, the rostrum is also of a lighter colour. Unengorged females of *eburneum* are wider and fuller anteriorly than those of *hebraeum*.

*Hosts*.—Same as *hebraeum*.

*Habitat*.—Same as *hebraeum*.

A careful study of my specimens of these two forms shows that they are very difficult to distinguish one from the other, and that there are many intermediate forms which might be included under either form. I find that in specimens of males which are plainly *eburneum* the transverse line connecting the two anterior longitudinal bands running along the cervical grooves is more often not present than present; also the posterior median dark line does not always run completely into the transverse median arched band. The differences between the type and the variety seems to be mainly one of intensity of colouration. In the females I also find the variations slight, although they are more easily distinguished than the males. I find that in the type occasionally the posterior median light coloured area may be extended anteriorly by two light coloured lines, which may be even confluent as in *eburneum*, but these areas are always of a dark bronzy colour in the type instead of a reddish grey as in the variety. The eyes of *hebraeum* seem to be usually of a darker colour than those of *eburneum*, but *hebraeum* never has the light coloured anterior margin to the shield which is present in *eburneum*, nor is the body of partly engorged females ever of the light colour which seems characteristic of *eburneum* females when in preservative fluid.

#### AMBLYOMMA VARIEGATUM. (FABRICIUS.)

##### THE VARIEGATED TICK.

*Acarus variegatus*, Fabricius (1794).

*Ixodes elegans*, Guérin-Ménéville (1829-1843).

*Amblyomma venustum*, Koch (1844, 1847).

*Amblyomma variegatum* (Fabricius) (Neumann, 1896.)

*Plate XII*, figures *k, l*; *Plate XIII*, figures *a, b*.

*Male*.—*Body* oval, wider behind, 5 mm. long (rostrum not included) by 3.5 to 4 mm. wide. *Dorsal shield* convex, covering all the upper surface, deep reddish brown, with copper-red spots, bordered with metallic green; cervical grooves short and deep; marginal grooves narrow, commencing a little behind the eyes, contouring the posterior margin, from which it is further distant than from the lateral edges, forms the anterior borders of the festoons; behind the cervical emargination, a copper-red spot, equal to about a third of the width, wider behind, where it is bordered by a curved, brown band; on each side of this spot is another, irregular longitudinal, concave inward, approaching the eye, on the corresponding side, with its anterior extremity, sometimes united to the median spot by a part of its inner margin, and continuing behind by a wide median spot which occupies almost all the width, and is separated from the marginal groove by a brown line, this latter is prolonged on the median line in a very narrow line, and may have another triangular prolongation in front opposite the penultimate festoon: festoons elongate, reddish brown, bordered with yellowish white the same as all the contour of the body; punctuations scattered, ordinarily not very deep, unequal; eyes hemispherical, shining, anterior, brownish or yellowish, in orbits. *Ventral*



surface often swollen, greenish grey, with the marginal chitinous, reinforcements brownish, separated by grooves and corresponding to the dorsal festoons; sexual orifice opposite coxae II, wide, anterior valve chitinous, sexual grooves at first almost parallel, then very divergent between coxae IV and the anus; anus near the posterior quarter; hairs very short on all the ventral surface; stigmatic plates white, with chestnut margins triangular with rounded angles, the postero-lateral angles well marked. *Rostrum* (XIII, *a*) 2 mm. long; base concave on its posterior margin, lateral margin convex; mandibles (XII, *b*) with inner apophysis sub-terminal, transverse, festooned in three points, one median, and two lateral, of which the inner is elongate transversely; outer apophysis with two teeth, the terminal small, the other very strong; hypostome a little spatulate, numerous denticles on the tip, followed by three then by four rows of teeth on each half, which gradually diminish and become squamiform on the basilar half of the organ; palpi 1.4 mm. long; article I with its ventral surface twice as long as the dorsal and prolonged on the inner edge by an obtuse point over article II; article II twice as long as article III, and prolonged on its extero-dorsal base into a flat point over the first; hairs rather long on the two edges of the convex surface of articles II and III. *Legs* thick, reddish brown; coxae contiguous (XII, *l*); coxae I divided into two blunt spines; the outer longer; coxae IV with a single strong spine; coxae II and III unarmed; the other articles, save the tarsi, ringed with whitish colour on their distal extremities; tarsi I at least four times as long as wide, suddenly attenuated near the extremity; tarsi II, III, and IV at least three times as long as wide, with two strong consecutive spines; caruncle reaching scarcely to the middle of the length of the claws; short hairs on all the articles.

*Female*.—*Body* almost the same form as in the male, relatively narrower, dimensions ordinarily a little larger, even when young; colour generally deep greenish brown, except the shield, the rostrum, and the legs, which are deep reddish brown. *Shield* triangular in its posterior two thirds, with posterior angle rounded, a little wider (3 mm.) than long, deep brown, sometimes with a reflection or spot of greenish metallic red in the centre or near the posterior angle and the origin of the cervical grooves; cervical grooves deep in front, prolonged almost to the posterior margin; punctuations deep, large, unequal, very numerous, often contiguous; eyes near the anterior quarter, similar to those of the male. *Dorsal surface* unicoloured, deep green, a marginal groove situated at a nearly uniform distance from the margin, forming the anterior margin of the eleven posterior festoons, which are scarcely longer than wide. A median groove, extending from the median festoon to a certain distance from the shield; two lateral grooves, concave outward, beginning at the space between the penultimate and antepenultimate festoons; punctuations deep, equal, scattered over all the surface. *Ventral surface* deep green, similar to that of the male; sexual orifice narrower; marginal festoons not chitinous; an ano-marginal groove; stigmatic plates larger. *Rostrum* (XII, *b*) 2.6 mm. long, similar to that of the male, except in the following particulars: porose areas present and large, oval digit of mandibles with inner apophysis bicuspid, base swollen; outer apophysis with three teeth, the two posterior strong. *Legs* rather longer, hairs rather long; spine of coxae IV reduced to a flat tuberosity; the penultimate tarsal spine attenuated, often almost effaced.

The fecundated and engorged female can reach the largest dimensions of the family (24 mm. long by 15 mm. wide, and almost as thick). At first



it is the same colour as in earlier stages, but later it becomes nutmeg brown. The body is at first rectangular, with rounded angles, and faces only a little convex, then it becomes more and more swollen ; coxae very distant ; no grooves or festoons.

*Nymph*.—*Body* brownish, 2 mm. long (rostrum included), the shape of a young female. *Shield* without metallic reflections, reddish brown. *Coxae* with spines scarcely visible ; no tarsal spines.

*Larva*.—*Body* oval, swollen, 0.7 mm. long.

*Hosts*.—Cattle principally, but also horses, goats, rhinoceros (Mozambique, German East Africa, Abyssinia), zebra, and sheep.

*Habitat*.—Abyssinia, Zanzibar, Madagascar, Mauritius, Senegal, Congo, Ivory Coast, Sierra Leone, River Niger, River Zambesi, Transvaal, Cape Colony, Manicaland (Rhodesia), German East Africa, Mozambique, Angola, Togo, Guinea.

*Life History*.—Never reared in Transvaal, but Lounsbury has tried and found that it was practically the same as *A. hebraeum*. It always leaves the host to moult. This tick is very closely related to *hebraeum*. It is confined, however, mostly to tropical Africa, and is only occasionally taken in South Africa. It has become naturalised in Guadeloupe Islands, where it seems to have been taken from Senegal.

## AMBLYOMMA MARMOREUM. KOCH.

### THE TORTOISE TICK.

*Amblyomma marmoreum*, Koch (1844, 1847).

*Hyalomma devium*, Koch (1844, 1847).

*Amblyomma devium* (Koch) (Neumann, 1899).

*Amblyomma rugosum*, Neumann (1899).

*Amblyomma marmoreum*, Koch (Neumann, 1901).

*Plate XII*, figures *m*, *n* ; *Plate XIII*, figures *c* to *k*.

*Male*.—*Body* oval, reaching 8.5 mm. long (not including rostrum), by 7 mm. wide. *Dorsal shield* (*XIII*, *c*) a little convex, punctuations unequal, fine ones very numerous and very fine, the others very large, scattered, showing granulations at their bottoms ; cervical grooves narrow and deep ; marginal groove deep at a distance from the margin, beginning about at level of coxae III, and contouring the posterior margin, where it forms the anterior margin of the festoons very distinctly ; anteriorly it is indicated by a row of punctuations more or less regular ; general colour light grey, with a metallic copper tinge, and with dark brown spots as follows : Two narrow bands on the cervical grooves ; behind these two rectangular areas separated behind, but joined in their middle by a transverse line in the posterior third ; three bands converging in front, enlarged, or not in their anterior extremity, on the marginal cushion, in front of the festoons, three to five successive spots, the anterior of which borders on the outer edge of the eye ; the festoons bordered with brown on their inner edges. *Eyes* large, flat, yellowish. *Ventral surface* light greyish in colour, the festoons marked by brown spots and grooves of separation ; a dark line anterior of median, and festoons second from median ; stigmatic plates triangular ; postero-lateral angle prolonged laterally. *Rostrum* rather short, dark coloured, base small, rectangular on posterior margin ; metallic spot on

dorsal surface; palpi short and thick; article II curved toward the ventral surface, twice as long as article III; hypostome with numerous denticles at tip; followed by seven or eight rows of strong teeth, three to a row; below this numerous squamiform teeth; from middle of hypostome downward a fourth row of small teeth along median line; inner apophysis of mandible transverse, unidentate (*XII, m*); outer apophysis bidentate. *Legs* strong, chestnut brown, ringed with lighter colour at distal extremities of articles; marked with punctuations; coxae I with two short, flat spines, a single spine similar to these, but stronger, on coxae IV (*XII, n*); tarsi short, thick, suddenly attenuated.

*Female*.—Unengorged, female a little larger than male; when engorged, body oval, flat, reaches dimensions of 33 mm. long by 20 mm. wide. *Shield* (*XIII, d*) triangular, scarcely wider (4 mm.) than long; posterior lateral sides almost straight; posterior angle narrow; scapular angles prominent in anterior points; eyes in anterior third of length; cervical grooves deep and wide, prolonged almost to the posterior margin; punctuations unequal; large ones rare; fine ones numerous, marked on light areas by black spots; ground colour bronzy grey as in male, and with spots of brown along the anterior margins, on the cervical grooves around the eyes, on the posterior margin opposite the cervical grooves, and near the posterior third of the lateral areas; eyes flat, whitish, brown when in preservative fluid. *Dorsal surface* (*XIII, d*) deep red-brown, wrinkled and deeply punctuated; a marginal groove; eleven posterior festoons well marked, dorsal porose areas present. *Ventral surface* reddish brown; posterior festoons very apparent. When engorged, body becomes light brownish grey, with a few salmon coloured blotches, surface usually covered with a whitish bloom; dorsal and ventral surface with grooves as in *hebraeum*; stigmatic plates large, whitish, triangular, with angles rounded; posterior lateral angle prolonged laterally, but not so much as in male. *Rostrum* 2.5 mm. long, reddish brown; porose areas of medium size, almost circular; hypostome spatulate, numerous denticles at tips, eleven rows of teeth on each half, three teeth to a row; squamose denticles to base; inner apophysis of mandibles with process transverse, tridentate (*XIII, e*); outer apophysis tridentate; palpi curved toward the ventral surface from the base of article II, wide, with parallel edges, otherwise similar to those of male. *Legs* long, strong, chestnut brown, ringed with lighter at distal ends of segments. Coxae I with two short teeth, strong, flat, separated; a triangular prominence flat, on the posterior margin of the others, larger on coxae IV; tarsi II, III, and IV sharply attenuated near their extremity.

*Nymph* (engorged).—*Body* widely elliptical, broadly rounded on both ends, with sides nearly parallel; up to 9 mm. long by 6 mm. wide; colour dark bluish, changing to a bright brown toward moulting time, and often covered with a coarse brown bloom. *Dorsal shield* (*XIII, h*) a little wider than long, broadly rounded on posterior angle, posterior lateral edges nearly straight; colour uniform dark brown, cervical grooves deep, then broad and shallow, extending nearly to posterior edges; punctuations unequal, large ones very large; eyes at lateral angles light coloured. *Dorsal surface* smooth, four anterior furrows; outer ones broken in middle; three posterior furrows, reaching nearly to the posterior margin, where there are two short furrows between their extremities. *Ventral surface* with furrows as in female; stigmatic plates whitish with dark

margins, slightly elliptical, with elongation extending postero-laterally; anus at posterior third of length. *Rostrum* (*XIII, h*) short, dark brown in colour; dorsal surface of base triangular in outline; palpi elongate and slender; article II more than twice as long as article III; hypostome spatulate, denticles on its tip, followed on each half by one row of four teeth, then by six or seven rows of strong teeth, two to a row, squamose denticles to base; mandibles with process of inner apophysis of digit tridentate, outer apophysis bidentate, with two small denticles on anterior edge of anterior tooth. *Legs* short, slender, dark reddish brown in colour; coxae each with a wide, sharply pointed spine on the posterior margin; tarsi short and thick, not sharply attenuated at terminus.

*Larva* (unengorged).—Colour light yellowish brown, shield darker, oval in outline, slightly longer than wide; length 0.75 mm., width 0.50 mm. *Shield* covers anterior third of body, much wider than long, broadly rounded behind, surface reticulated; cervical grooves deep and straight, almost reaching the posterior margin; no marginal groove; cervical emargination very deep; eyes flat, at lateral angles, small, yellowish. *Dorsal surface* (*XIII, k*) with a long median groove; a marginal groove extending all round the body, forming the limit of the festoons, and in dried specimens causing the edge of the body to turn up sharply; festoons large, well marked. *Ventral surface* (*XIII, i*) with three posterior grooves, radiating from the anus, which is anterior of the posterior third; festoons well marked; marginal groove not marked; stigmatic openings large in three pairs, one pair posterior of each pair of coxae. *Rostrum* wide and narrow on dorsal surface; lateral angles sharply pointed, posterior margin straight; articulated with shield by a very long neck; ventral surface more or less rectangular in outline, lateral angles not prominent; hypostome spatulate, with denticles at tip, then four rows of large sharp teeth, seven teeth in each row; mandibles (*XIII, g*) with outer apophysis bidentate, the anterior margin of the anterior tooth bearing a crest composed of two larger teeth, on the inner edge of them a row of saw teeth; inner apophysis with process tridentate; palpi long and slender, article I very short, cylindrical; articles II and III of about equal length, swollen at their anterior ends; article II very much constricted at its base, anterior half and article III concave on their inner edges. *Legs* thick, almost translucent in colour; coxae large, well separated from each other, coxae I triangular, coxae II and III rectangular in outline, each with two wide blunt teeth on posterior margin, almost unnoticeable on coxae III; tarsi normal.

*Eggs*.—Small, elliptical, surface smooth and shining; 0.75 mm. long by 0.3 mm. wide; colour light reddish brown, singly, but in a mass dark reddish brown.

*Hosts*.—Tortoise, rhinoceros (*Rhinoceros lucerius*), snakes. Larvae and nymphs also feed readily on ox and goat, and on some kinds of birds and lizards.

*Habitat*.—Cape Colony, Transvaal, German East Africa, British East Africa, Zanzibar, Upper Zambesia.

This tick is a very common parasite on tortoises in South Africa. It does not seem to be influenced by climatic conditions to the same extent as the two last-mentioned species, being found alike in the dry, semi-desert regions, and in regions of abundant rainfall. Nymphs and adults are found in large numbers on tortoises.



## AMBLYOMMA CRENATUM, NEUMANN.

## THE RUFFLED TICK.

*Amblyomma sublatum*, Neumann (1899).*Amblyomma crenatum*, Neumann (1899).

## Plate XII, figure i.

*Male*.—*Body* a short oval, sides rounded, 7 mm. long (without rostrum), 6.5 mm. wide. *Shield* a little convex, dirty yellow, with a thin whitish bloom in the scapular angles and on the sides; in the middle a brownish, narrow band, prolonged to the lateral margin by a wider band, not distinctly limited; near the posterior quarter, a median irregular spot of the same colour, joined in front to the transverse border by two curved lines, and giving off behind three short prolongations, of which one is a median. *Eyes* large, flat, scarcely paler than the shield and finely bordered with brown; cervical grooves short and deep; marginal groove narrow; not very deep, contouring the posterior margin, from which it is twice as far removed as the lateral margin; festoons narrow, at least twice as long as wide; punctuations numerous, large, equal, not very deep, regularly distributed, and of the colour of the shield; among them some punctuations more numerous, very fine, superficial, brown. A posterior constriction, well marked, at the level of the stigmatic plates. *Ventral surface* of the same colour as the shield, glabrous; posterior festoons very apparent, not limited in front, marked in the middle by diffuse brownish spots; stigmatic plates large, whitish, comma-shaped, with tail short, projecting outward. *Rostrum* very large (3 mm.), brownish; base a little constricted behind, posterior angles scarcely salient, very finely punctured; hypostome armed, in its anterior third, with three rows of strong teeth on each half; palpi long, brownish, the second article more than twice as long as the third. *Legs* very long, strong, intermediate articles yellowish white, the fourth reddish in the middle, the fifth in its proximal half; coxae I divided into two large spines, the outer strong and sharp, the inner wide and a half shorter; a long blunt spine on coxae IV; tarsi relatively long, with two strong consecutive spurs.

*Female*.—*Body* in a short oval; sides rounded; flat; 9 mm. long (without rostrum), 8 mm. wide. *Shield* (XII, i) triangular, a little wider (5.2 mm.) than long; cervical emargination prolonged in front by two points, anterior margins a little oblique, the latero-posterior almost straight, posterior angle wide and a little rounded; cervical groove at first straight and very divergent, then bifurcate, the inner branch bordering on the median area, the outer short; median area a little salient; punctuations numerous, unequal, abundant, and confluent about the eyes; colour reddish yellow, with a yellowish white bloom on the lateral areas, along the cervical margin and in the posterior angle; a small brownish marginal spot on each side at the posterior third of the lateral border. *Eyes* large, flat, relatively anterior, yellowish. *Dorsal surface* (XII, i) reddish brown, pitted with numerous and large punctuations; a marginal groove, bordering the posterior festoons in front, which are longer than wide, inner margins longer than outer, giving a crenulate aspect to the posterior margin of the body. *Ventral surface* of the same colour; punctuations finer, surmounted by fine hairs; stigmatic plates large (2.6 mm. long), triangular angles rounded. *Rostrum* (XII, i) very



long (4 mm.) ; base wider than long ; hypostome a little spatulate, armed, on the interior half, on each side with three longitudinal rows of 8 to 10 teeth each, the outer row longer, the inner removed from its neighbour and doubled behind by a fourth shorter row ; squamiform denticles behind the teeth ; palpi with the third article as wide as long, dilated on its inner dorsal margin. *Legs* very long, strong ; coxae I bicuspid ; the others flat, and a little attenuated on their posterior margin ; tarsi long, sharply attenuated at their extremity, two strong terminal spines, claws long, caruncle short.

*Hosts*.—Rhinoceros.

*Habitat*.—Sumatra (?), Cape Colony.

I have never seen a specimen of this species. The description is taken from Neumann.

### AMBLYOMMA SYLVATICUM, (DE GEER).

#### THE CAPE TORTOISE TICK.

*Acarus sylvaticus*, De Geer (1778).

*Cynorhaestes sylvaticus*, Hermann (1804).

*Amblyomma sylvaticum*, Koch (1844).

*Hyalomma devium* (female), Koch (1847).

*Ixodes sylvaticus*, Gervais (1844).

*Amblyomma sylvaticum* (De Geer) (Neumann, 1899).

*Male*.—*Body* regularly oval ; sides rounded ; 4.5 mm. long (rostrum not included), 3.2 mm. wide. *Shield* chestnut brown, lighter on the margin, convex ; cervical grooves short, deep, lunate ; no marginal groove ; posterior festoons with separations not very deep ; punctuations numerous, deep, very unequal, some disposed in a series replacing the marginal groove on the sides ; eyes small, shining, hemispherical, sub-marginal in an orbicular excavation ; on the margins and on the last penultimate festoon an irregular spot, yellowish white, or reddish yellow. *Ventral surface* yellowish ; stigmatic plates in a short comma, bordered with whitish. *Rostrum* chestnut brown, 1.7 mm. long, base relatively long and narrow ; hypostome wide spatulate, with numerous anterior denticles, of which the marginal ones are bifid or trifid, followed on each half by four rows of eight teeth each, decreasing from front to back ; numerous posterior squamose denticles ; palpi of medium length, spotted with whitish on the inner margin of their upper surface. *Legs* of medium length ; coxae small, all with two short points on their posterior margins ; movable articles whitish on their dorsal border ; tarsi sharply attenuated at their extremity ; a terminal spur, very small on tarsi II, III, and IV ; caruncle scarcely passing the base of the claws.

*Female*.—*Body* oval, 6 mm. long (not including rostrum), 5 mm. wide. *Shield* oval, cordiform, as wide or wider than long, whitish yellow in the larger part of its extent ; a border of blackish brown on the sides, narrow, except at the level of the eyes, which it surrounds ; cervical grooves deep in front, reaching almost to the posterior margin, covered by a blackish band in the middle of the lateral area, a small black spot ; punctuations deep, unequal, black ; sometimes a brown spot in the median area ; eyes as in the male. *Dorsal surface* reddish brown ; when young a marginal

groove stopping at the penultimate or antepenultimate festoon ; festoons well marked ; punctuations deep, distant ; hairs scattered, rather long. *Rostrum* as in male, often a yellow spot between the porose areas ; long hairs on the palpi. *Legs* as in male. Engorged female can reach to 15 mm. long by 11 mm. wide.

*Nymph*.—Form of the female, shield relatively wider ; yellow bloom less extended.

*Habitat*.—Cape Colony.

*Hosts*.—Tortoise, deer.

I have not seen this species, and have taken the description from Neumann.

#### GENUS APONOMMA, NEUMANN.

*Ixodes* (ex. p.), Latreille (1796).

*Ophiodes*, Murray (1879). (Name preoccupied.)

*Aponomma*, Neumann (1899).

No eyes. Base of rostrum usually pentagonal, with latero-dorsal edges very short. Palpi long. *Male* with body wider or almost as wide as long ; ventral surface naked ; sexual grooves very divergent behind, anal groove semi-circular or pointed, opening in front, joining the sexual grooves ; ano-marginal grooves median ; dorsal shield covering all the upper surface, and usually marked with metallic green spots ; stigmatic plates comma-shaped. *Shield of Female* shorter or scarcely longer than wide, usually marked with metallic green spots, disposed in a triangle ; grooves on the ventral surface as in the male ; stigmatic plates shorter, less attenuated at the postero-external extremity.

This genus occurs almost exclusively on snakes and lizards, although *Aponomma exornatum* is reported as having been found in South Africa on a dog. From the colouration and grooves on the ventral surface it would seem to be closely related to the genus *Amblyomma*. It differs from that genus, however, by the absence of eyes and the form of the body. The absence of eyes and length of rostrum have generally made species of this genus rank among the *Ixodes*, from which they differ, however, by the general conformation. Only three forms are reported from South Africa.

#### *Male*.

A. Shield marked with nine metallic green spots. . . . . *exornatum*.

AA. Shield uniform, pale brownish, without metallic green spots.

B. Tarsi II, III, and IV attenuated at extremity . . . . . *laeve capense*.

BB. Tarsi with a bosse at extremity . . . . . *latum*.

#### *Females*.

A. Shield marked with three metallic green spots ; shield as long or longer than wide ; punctuations fine, close . . . . . *exornatum*.

AA. Shield uniform, reddish brown, without green spots ; wider than long ; punctuations small and few.

B. Coxae I with blunt, flat spurs, punctuations on dorsal shield obsolete . . . . . *latum*.

BB. Spines on coxae I sharp ; punctuations small and few . . . . . *laeve capense*.

*Nymphs.*

- A. Eye-like reddish spot on each antero-lateral angle of shield, which is nearly colourless otherwise. . . . . *laeve capense*.  
 A.A. Shield dark reddish brown, except postero-median area, which is lighter, no reddish eye-like spot on shield . . . . . *exornatum*.

*Larvae.*

- A. Dorsal shield uni-colour, no eye-like reddish spots present. . . . . *exornatum*.  
 A.A. Dorsal shield with eye-like reddish spots in antero-lateral angles. . . . . *laeve capense*.

## APONOMMA EXORNATUM. (KOCII.)

## THE LIZARD TICK.

*Amblyomma exornatum*, Koch (1844, 1847).

*Ixodes flavomaculatus*, Lucas (1846-51-67).

*Ophiodes flavomaculatus*, Murray (1879).

*Ixodes varani*, Lewis (1892).

*Aponomma exornatum* (Koch) (Neumann, 1899).

Plate XIV, figures *a* to *i* ; Plate XV, figures *a* to *c*, *f*.

*Male*.—*Body* short, almost as wide as long, somewhat quadrangular or orbicular, length 3 mm. to 5 mm. (rostrum included), width 2.5 mm. to 3.3 mm. *Shield* covers all the dorsal surface, glabrous, punctuations very small, somewhat unequal, distributed over all the surface ; cervical grooves very short, wide and deep ; eleven posterior festoons with separating grooves short and rather shallow ; dorsal porose areas just below the middle of the length, small and widely separated ; ground colour of shield a deep reddish brown, lighter on the edges, on this is arranged nine large metallic green spots, sometimes almost invisible, as follows :—Two short sub-triangular spots, one in each cervical angle, next the insertion of the rostrum ; two linear marginal spots, one behind each of the cervical spots, a spot inside each of these linear spots, converging anteriorly at about the same level, and extending backward, passing them laterally by a widening of their posterior ends ; two posterior spots separated by the median line, and close to the festoons a median spot, somewhat rectangular, and not far posterior of the extremities of the cervical grooves. *Ventral surface* (XIV, *a*) reddish yellow ; many small equal punctuations, especially near the anus ; festoons showing slightly on the posterior margin ; sexual orifice rather wide opposite coxae II ; sexual grooves widely divergent behind coxae IV, reaching nearly to the margin ; anus very far caudad ; anal groove semi-circular, opening forward ; ano-marginal groove short : stigmatic plates large sub-triangular, elongate, postero-laterally, narrow in front. *Rostrum* (XIV, *b*) narrow, base nearly twice as wide as long on dorsal surface, rounded on the sides ; mandibles (XIV, *c*) with inner apophysis of digit bearing a simple transverse process ; outer apophysis with a single strong tooth ; hypostome spatulate, with numerous denticles anteriorly, followed by three longitudinal rows of teeth on each half, consisting of seven to eight teeth each, then a series of squamiform denticles cover the rest of the organ to near the base ; palpi

long, article I small and narrow, article II attenuated at its base, at least twice as long as article III, article IV very small, hidden in a pit near the extremity and on the ventral surface of article III with numerous terminal hairs; marginal hairs on articles II and III. *Legs* brownish, of medium length, thick and swollen, hairs rare and short; coxae rather long, a single short spine on the postero-median margin of each; tarsi at least three times as long as wide, a large bosse near the extremity and on the dorsal side of each, two consecutive spurs, the terminal larger, on coxae II, III, and IV; caruncle short, scarcely reaching a quarter of the length of the claws.

*Female*.—*Body* thick, wider behind than in front, widely rounded at the two extremities; colour generally reddish brown; reaching a length of 7 mm. and a width of 5 mm. or more. *Shield* heart shaped, as long as wide, contour a little sinuous, posterior angle rather narrow, well emarginated in front, glabrous; cervical grooves wide, deep, and short, prolonged backward by a superficial groove, which is concave outward; punctuations, fine numerous, three metallic green spots as follows:—One in each cervical angle, bordering on the cervical grooves, and one on the posterior angle; sometimes the spots are very faint in colour, but always more or less sharply defined. *Dorsal surface* with four anterior grooves, short and symmetrical, followed by three shorter grooves, and finally by three or five grooves, which are long and close to the median line; hairs very short, scattered; punctuations fine, scattered, porose areas just posterior of shield, widely separated. *Ventral surface* with colour, punctuations, and hair as on dorsal surface; sexual orifice narrow, a little in front of the level of coxae II; sexual grooves very widely separated behind; anus near the posterior quarter of the length of the body; anal groove semi-circular, opening forward; ano-marginal groove long, a short groove on each side of it, in partly engorged females; stigmatic plates large, triangular, transverse. *Rostrum* (XIV, g) rather large, narrow, nearly as long as shield; base with dorsal surface nearly as long as wide, rounded on the sides; porose areas large, deep, slightly elongate longitudinally; digit of mandibles with inner apophysis strong, conical, base thick, point recurved, with the transverse process near the tip, outer apophysis with three teeth, strong, largest near the base; hypostome with denticles at tip, then six to seven large teeth in a row, crenulations to base (XIV, d); palpi as in male. *Legs* as in male: coxae bearing one spine on their postero-median margin (XV, c); tarsi as in male, except that only on tarsus I is the bosse near its extremity very prominent (XIV, i).

*Nymph*.—*Body* flattened, wider behind, broadly rounded at both extremities, almost orbicular; colour dark reddish brown; length 2.3 mm. (without rostrum), width 2 mm. *Shield* (XIV, e) dark chestnut brown, postero-central area and posterior edge of the cervical emargination a little lighter; heart shaped; as wide as long; widely rounded behind; postero-lateral edges concave; antero-lateral edges convex; punctuations few but large, and of equal size; cervical grooves deep at first, then shallow and diverging toward the margins; cervical emargination shallow. *Dorsal surface* with a few large punctuations and a few whitish short hairs; four short anterior grooves, followed by a set of two short lateral grooves on each side, one anterior of the other, and these in turn by three long grooves, one median and two lateral, which diverge posteriorly, with the addition of a short groove on each side of



the median groove at its extremity ; caudal festoons faintly indicated. *Ventral surface* (XV, a) of same colour as dorsal surface ; genital grooves beginning opposite coxae IV, and widely diverging ; anal groove semi-circular and opening in front ; ano-marginal groove long and deep, a small groove on each side of it ; stigmatic plates elliptical transverse (XIV, f). *Legs* light brown, short and thick ; coxae elongate, like those of the female. *Rostrum* small, narrow, base triangular on the dorsal surface, as long as wide, rectangular on the ventral surface, twice as wide as long, sides rounded ; hypostome spatulate, many small denticles at its tip, then three rows of teeth on each half, consisting of eight or nine large sharp teeth, below these numerous squamiform teeth, extending to near the base ; mandibles as in the female ; palpi elongate, thicker than in adults ; article I very short and almost glabrous ; article II constricted at its base, and twice as long as article III ; article IV small, papilliform, and arranged as in adult.

*Larva*.—Nearly circular in outline ; engorged larva 0.75 mm. wide by 1 mm. long, including rostrum ; colour light yellowish brown, with shield and rostrum darker reddish brown ; integument finely wrinkled ; festoons well marked. *Shield* (XV, f) heart shaped, finely reticulated, cervical emargination deep, cervical grooves deep, and reaching almost to posterolateral margin ; no eyes. *Ventral surface* (XV, b) like dorsal ; festoons not so well marked ; anus near posterior third ; anal groove present, semi-circular ; ano-marginal groove faint ; no genital grooves ; stigmatic pores in three pairs, one behind each coxa. *Legs* slender, light yellow ; coxae I triangular ; coxae II and III rectangular, each with posterior spine ; tarsi thick, dorsal surface prominent. A few fine hairs on both surfaces of the body. *Rostrum* light coloured, elongate ; base triangular on dorsal surface, wider than long ; quadrangular on ventral surface ; palpi elongate, article I short and narrow ; article II twice as long as wide, constricted at base ; article III nearly as long as article II ; article IV very small and papilliform ; mandibles like those of female ; hypostome as in female.

*Eggs*.—Very small, 0.50 mm. long by 0.40 mm. wide, light brownish in colour.

*Hosts*.—Iguana (*Varanus niloticus*) in Transvaal, Natal, Cape Colony, and Senegal ; *Varanus sp.* in German East Africa and Algeria ; *Python sebai* ; dog in South Africa. Both nymphs and adults are found on the above hosts.

*Distribution*.—German East Africa, Madagascar, Natal, Transvaal, Cape Colony, Senegal, Congo, Algeria.

This species is very common in the Transvaal on iguanas, snakes, and large lizards, but has never been bred out. Nymphs and larvae are also common on the same hosts as the adults.

APONOMMA LAEVE, var. CAPENSE. NEUMANN.

THE SNAKE TICK.

*Aponomma laeve*, Neumann, var. *capense*, Neumann (1901).

Plate XV, figures d, e, g, h, i.

*Male*.—*Body* short, oval in outline, wider behind, where it is widely rounded ; length 3 mm., including rostrum ; width 2 mm. *Shield* light yellowish brown in colour, often so thin as to show the internal organs in

the outline ; covers all of the dorsal surface : smooth with no punctuations ; no marginal grooves ; no eyes ; no cervical grooves ; cervical emargination deep ; festoons very short and poorly defined ; dorsal porose areas just posterior of level of coxae IV, small, and widely separated. *Ventral surface* yellowish white, with alimentary canal sometimes showing through as white ; numerous fine punctuations and many short whitish hairs ; festoons much larger than on dorsal surface, and more sharply defined ; sexual orifice opposite coxae II ; sexual grooves very divergent behind coxae IV ; anus at the posterior quarter of the length ; anal groove semi-circular, opening in front ; ano-marginal groove very faint ; stigmatic plates large, sub-triangular, a narrow postero-lateral prolongation. *Rostrum* colour of shield, long and slender ; base almost triangular on the dorsal surface, sides rounded, rectangular on the ventral surface, wider than long ; hypostome spatulate, small denticles on the tip, then eight transverse rows, three teeth each on each half, the two outer teeth on each row very large and sharp, below these, and extending to the base, are indications of denticles, but represented only by crenulate creases ; mandibles (XV, *h*) with inner apophysis of digit very thick and stout, recurved at the tip and bearing below the tip a paired or double transverse process with teeth projecting outward, outer apophysis with one large strong tooth bearing two very small teeth on its anterior edge ; palpi elongate, more slender than in *exornatum*, excavated on inner edge ; article I very short ; article II constricted at its base, and twice as long as article III ; article IV papilliform, and in a pit on the antero-ventral part of article III. *Legs* short, but not so thick as in *exornatum* ; coxae rather short, almost contiguous, each with a long sharp spine on the median part of the posterior edge (XV, *d*) ; tarsi long and slender, sharply attenuated at extremity, a single spur on the ventral surface.

*Female*.—*Body* in a short, wide oval ; convex on the dorsal surface ; unengorged 3 mm. long (without rostrum) by 2.5 mm. wide. *Shield* reddish mahogany brown, clear, cordiform, the lateral angles at the anterior third of the length, the two postero-lateral margins concave, posterior angle rounded ; cervical grooves lacking ; cervical emargination deep ; punctuations very small, superficial, and few in number, located mostly in the anterior angles. *Dorsal surface* reddish yellow, grooves very superficial ; eleven marginal posterior festoons, very short ; dorsal porose areas very small, immediately posterior of shield. *Ventral surface* of same colour ; a few scattered white hairs ; sexual orifice opposite the interval between coxae II and III ; anus rather posterior ; anal groove in a wide semi-circle ; ano-marginal groove short ; posterior margin festooned as on the upper surface, only more strongly marked, stigmatic plates large, pale, comma-shaped. *Rostrum* narrow, long, base with sides rounded, fitted into emargination of shield ; porose areas elliptical longitudinally, small and far apart ; digit of mandibles with inner apophysis rather anterior, transverse ; outer apophysis with three teeth progressively increasing ; hypostome wide, with three rows of teeth on each half, six to seven teeth in each row, many small denticles on tip, and below them the large teeth, then crenulate to base ; palpi narrow. *Legs* of medium length, thick hairs rare and short ; coxae large, narrow, dark coloured, two long sharp spines on the posterior margin of coxae I, a single long spine on median posterior margin of coxae II, III, and IV ; tarsi three times as long as wide, those of first pair longer, and swollen at level

of false articulation, the bosses of tarsi not pronounced ; a small terminal spur.

*Nymph.*—*Body* broadly oval ; widely rounded at both extremities ; almost as wide as long, unengorged 1 mm. (without rostrum), engorged 2.3 mm. long by 2 mm. wide (with rostrum) ; colour light yellowish, almost translucent. *Shield* (XV, g) heart shaped, as wide as long, broadly rounded at posterior angle, postero-lateral edges slightly concave, antero-lateral edges, colour light yellowish with reddish eye-like spot in each antero-lateral angle ; cervical emargination deep, no cervical grooves ; no punctuations. *Dorsal surface* with a median and two lateral grooves, all three long and straight ; festoons well marked. *Ventral surface* same colour as the dorsal ; anus at the posterior third ; coxal grooves widely divergent behind ; anal groove semi-circular, opening in front ; ano-marginal groove long and distinct ; festoons present ; stigmatic plates almost circular, slightly elongate on postero-lateral edge. *Rostrum* small, slender ; base nearly triangular on dorsal surface, rectangular ; ventral surface slightly wider than long ; hypostome with numerous small denticles at the tip, then two rows of three teeth each, followed by two series of teeth on each half, consisting of six teeth in each series ; mandibles (XV, i) with inner apophysis of digit slender, and bearing a lunate process near its tip, the extremities of which are sharp and extend outward, the outer apophysis bears four teeth, the two lower very large, the two anterior very small ; palpi elongate, excavated on inner edge ; article I very short and wide ; article II constricted at base, and twice as long as article III ; article IV as in male, only a little larger proportionately. *Legs* short and thick, light yellowish in colour ; tarsi I very long ; all tarsi gradually attenuated at their extremity ; no spurs present ; coxae (XV, e) rather elongate, coxae I with a short spine on its posterior median angle ; coxae II, III, and IV with a short blunt spine on the middle part of the posterior edge.

*Larvæ.*—*Body* short, nearly circular in outline, unengorged 0.8 mm. wide by 1 mm. long, including rostrum ; engorged 1.3 mm. long, including rostrum, by 1 mm. wide ; colour yellowish brown (almost colourless). *Shield* same colour as body, heart shape, posterior angle broad, surface finely reticulated, cervical grooves deep, concave outward, no marginal grooves, at each antero-lateral angle a light reddish eye-like spot. *Dorsal grooves* and festoons faintly marked. *Ventral surface* same colour as dorsal ; anus at posterior fourth of length ; anal groove semi-circular, other grooves only faintly marked ; three pairs of stigmatic plates, one behind each coxa. *Rostrum* similar to that of *exornatum* ; mandibles with inner apophysis bidentate, outer apophysis with four teeth ; hypostome spatulate ; several denticles at tip, then two rows on each half of three teeth each, followed by five or six rows of large teeth, two teeth on each half to a row ; palpi slender, article I short, articles II and III about equal in length. *Legs* very slender and light coloured ; coxae each with a sharp spine on their posterior margins.

*Hosts.*—Black snake (Cape Colony), Mamba (*Dendraspis angusticeps* (Transvaal), and other snakes. Both adults, nymphs, and larvae have been found on snakes.

*Distribution.*—Cape Colony (Adelaide), Transvaal, Mozambique.



## APONOMMA LATUM. (KOCH.)

*Amblyomma latum*, Koch (1844, 1847).*Aponomma politum*, Neumann (1899).*Amblyomma laere*, Neumann (1899).*Aponomma latum* (Koch) (Neumann, 1901).

*Male*.—*Body* oval, flat, 5 mm. long (without rostrum), 4 mm. wide, ochreous yellow in all its parts. *Shield* covers all the dorsal surface, uni-colour, glabrous; cervical grooves short, concave; no lateral grooves; posterior festoons elongated, with separations deep and curved outward; a few punctuations, very fine, more sparsely scattered about the periphery of the shield; on each margin at the level of legs II, a smooth area, representing an obsolete eye. *Ventral surface* clothed with very short, translucent hairs; stigmatic plates comma-shaped. *Rostrum* 1.3 mm. long; hypostome with three rows of teeth on each half; first pair of coxae provided with two short, blunt spines; coxae III with a large dentate plate; the other coxae unarmed; tarsi short, with a bosse near their outer extremity; claws long, caruncle short.

*Female*.—As wide as long (2.7 mm.), but widest behind; when fully engorged it may become as much as 9 mm. long by 6.5 mm. wide; colour reddish brown. *Shield* reddish brown, uni-colour without spots, heart shaped, almost as wide as long, smooth and shining, punctuations very fine, almost invisible; cervical grooves reduced, only extremities present. *Dorsal surface* deep reddish yellow, a little lighter on the edges, and smooth, a little shining; usual grooves replaced by shallow depressions; posterior festoons rather prominent. *Ventral surface* lighter coloured than dorsal, a few short hairs and punctuations present. *Rostrum* reddish in colour; base rectangular, almost twice as wide as long; hypostome elongate, rounded at the tip, three rows of teeth on each half; palpi long, flat, narrow, hairs present; porose areas not very deep. *Legs* slender, of medium length; coxae like those of male, tarsi longer than those of male, and bosse less prominent.

*Hosts*.—Serpents, *Python molurus*.*Habitat*.—East Indies, Durban.

This species I have never seen. The description is compiled from those given by Neumann.

## GENUS NEUMANIELLA. (LAHILLE.)

*Neumaniella*, Lahille.

*Body* wider than long; narrow in front, and very wide behind; palpi elongate, but shorter than in *Aponomma*; no eyes; sexual grooves very short or entirely lacking; no anal groove.

This genus was established by Lahille on the species *Aponomma transversalis*, Lucas, a South African species. It is very closely related to *Aponomma*, and differs from it mainly in the shape of the body, wider than long, whereas the species of *Aponomma* are as long as wide, and by the very short sexual grooves on the ventral surface, or entire absence of them, and the entire absence of the anal groove. When Neumann described this type species (1899) he drew attention to the fact that it differed considerably from the typical *Aponomma*, and suggested that it might eventually be



proved to constitute a separate genus. It seems to me that the differences are quite sufficient for that, and I have therefore followed Lahille in retaining it.

There is only one species belonging to this genus in South Africa, *Neumaniella transversale*. I have never seen a specimen, but have followed Neumann in the following description :—

NEUMANIELLA TRANSVERSALE. (LUCAS.)

PYTHON TICK.

*Ixodes transversalis*, Lucas (1844, 1845).

*Aponomma transversale*, (Lucas) (Neumann, 1899).

Plate XVI, figures *n* (*a*, *b*, *c*, *d*).

*Male*.—*Body* flat, narrow in front, very wide behind, wider than long, 3 mm. wide by 2.75 mm. long (rostrum not included). *Shield* reddish brown, glabrous, smooth, without punctuations or with punctuations very fine and few in number; cervical grooves straight, parallel behind, then two large pits, and at the periphery five to seven short, radiating grooves; marginal grooves not very apparent, but marking off a light coloured marginal area, narrow in front, wide behind, where it is divided into eleven poorly defined festoons. *Ventral surface* reddish yellow, concave, with very short, scarcely visible hairs; sexual opening opposite second inter-coxal space; sexual grooves very short; anus near the posterior third of the length of the body; no anal groove; ano-marginal groove well marked; stigmatic plates nearly transverse, short comma shaped. *Rostrum* 1 mm. long, base large, a little wider than long, dorso-posterior angles fairly prominent; mandibles [XVI, *n* (*a*)] with inner apophysis bearing a process with two teeth, and with base elongate longitudinally, and nearly half as long as the apophysis; outer apophysis with four teeth, the posterior strongest, and the base of the apophysis narrowed to a point; hypostome [XVI, *n* (*c*)] wide, spatulate, emarginate at tip, which is furnished with a very large number of small denticles, extending over the anterior third of the hypostome; two rows of seven to eight large teeth in each row along each outer margin; palpi thick, third article equal in length to two-thirds of the length of the second article, both articles with a few hairs on their margins. *Legs* short, thick, chestnut brown in colour; coxae rather strong, a short spine in the centre of the posterior margin of each; tarsi thick; tarsi IV twice as long as wide, each tarsus provided with two small terminal spurs, followed by a similar spur near the distal third of the ventral margin on tarsi II, III and IV; tarsi I bears *Haller's organ* in the middle of its length, false articulation near the middle of the length in tarsi II, III and IV [XVI, *n* (*d*)]; short hairs on all of the articles.

*Female*.—*Body* swollen; very wide, ordinarily 1.5 mm. long by 2.5 mm. wide, but may reach a size of 6 mm. in length and 8 mm. in width; glabrous; reddish brown or dirty green in colour. *Shield* [XVI, *n* (*b*)] cordiform in outline, angles rounded, except the posterior angle, which is a little emarginate; lateral margin very convex; colour reddish brown; no hairs and no punctuations; cervical grooves deep, nearly straight, and pointed, reaching posterior margin, and dividing the surface into three parts, median of which is rectangular in outline, the laterals triangular, and

not more than half as wide as the median area. *Dorsal surface* glabrous, several radiating deep pits, of which one is median and posterior; eleven festoons not very apparent on the posterior edge. *Ventral surface* concave or swollen, glabrous; festoons very short on the posterior margin; sexual orifice wide, prominent, opposite the second inter-coxal space sexual grooves very divergent; anus near the posterior quarter; anal and ano-marginal grooves not present; stigmatic plates oval; elongated transversely. *Rostrum* 1 mm. or more in length, base short, nearly three times as wide as long; porose areas large, not very deep, well separated, not apparent in young females; mandibles with inner apophysis bearing a short, sub-globose process inserted at near anterior third of apophysis, and bearing two small teeth; outer apophysis large, with three or four terminal teeth followed by two large, almost equal teeth; hypostome and palpi similar to those of the male. *Legs* similar to those of the male.

*Host*.—Python (*Python sebai*). Found in the sockets of the eyes (Neumann).

*Habitat*.—South Africa.

GENUS RHIPICENTOR. NUTTALL and Warburton.

*Rhipicentor*, Nuttall and Warburton (1907).

Eyes present; base of rostrum wider than long, lateral angles prominent; palpi as wide or wider than long; stigmatic plates comma shaped; no ventral anal plates; coxae I divided into two stout teeth; coxae IV of male very much larger than coxae I, II and III, and bears in both male and female two very large spines on the posterior margin.

RHIPICENTOR VICINUS. NEUMANN.

THE HEDGEHOG TICK.

*Rhipicentor vicinus*, Neumann (1908).

Plate VII, figures f to i.

*Male*.—*Body* sub-oval, wider near the posterior, slightly constricted behind the eyes, 6 mm. long (rostrum included), 3.2 mm. wide near the posterior third. *Dorsal shield* slightly convex, shining, chestnut brown in colour, without spots, narrow margin of the abdomen showing beyond the shield in the posterior two thirds; cervical grooves deep and wide, spreading out widely; marginal grooves commencing behind the eyes, deep, rather close to the margin, terminating in a groove between the two last festoons; punctuations large, sub-equal, not very numerous, very distant from each other, arranged in lines near the lateral margins, one to two punctuations on each festoon; more numerous in front of the eyes; in front of the festoon a crescent shaped depression, marked by fine punctuations. *Eyes* flat, yellowish, marginal, three small punctuations forming a border on the inner side. *Ventral surface* (VII, f) reddish yellow, with a few very short hairs; anal groove semi-circular, open to the front, supported behind by a single ano-marginal groove which terminates at the median festoon; genital grooves diverging widely behind coxae IV; ventral festoons well marked; wider than long, no groove limiting them in front; no caudal prolongation; stigmatic plates of a medium size, comma shaped, with the prolongation extending postero-dorsally. *Rostrum* (VII, g) 0.92 mm. long (from the tip of the palpi to the point of the posterior angles); dorsal surface of the base twice as wide as long, lateral angles near the anterior

third, very sharp and projecting : the posterior angles prominent but not spiniform, prolonged in front by a slight projection, which bounds a depression on the dorsal surface almost equal to a third of the width ; hypostome wide, slightly spatulate, six rows of strong teeth present ; palpi as wide as long, convex on their external edges ; the first article scarcely visible, the second nearly twice as wide as long, prolonged in a strong retrograde spine on its postero-ventral margin, and bearing a fringe of whitish hairs on the inner ventral margin ; the third article without ventral spines ; the fourth article small, and hidden in the pit of the third article. *Legs* strong ; coxae I as long as the dorsal surface of the rostrum, divided into two strong, sub-equal contiguous spines which form three-quarters of their length ; coxae II and III divided on their posterior margins into two flat, sharp spines, which are as wide as long ; coxae IV large, almost as wide as long, provided on their posterior margins with two long narrow sub-equal spines, well separated from each other, the inner one a little larger, not as long as the coxa ; article II of the first pair of legs provided near the distal extremity with a spine, dorsal, retrograde, flat, aliform and as wide as long ; articles III, IV and V short and thick ; tarsi small, sloping at the distal end, with a small spur and weak claws.

*Female*.—*Body* oval, 6 mm. long (rostrum included), 3 mm. wide, sides convex. *Shield* (VII, *h*) scarcely longer (2.5 mm.) than wide (2.3 mm.) irregularly oval, deep chestnut brown ; cervical grooves deep in front, prolonged almost to the posterior margin ; lateral grooves deep and wide each joining the corresponding cervical grooves in front and behind, and formed by punctuations in lines ; punctuations large, not very numerous, more numerous outside the lateral grooves, about a score in the median area ; a few very fine punctuations near the lateral margin ; eyes similar to those of the male ; situated slightly in front of the lateral angles, bordered on the inner margins by four large punctuations. *Dorsal surface* with a very few very short hairs ; two deep marginal grooves ; three longitudinal grooves, the median of which is confined to the posterior quarter, the other two are symmetrical, extending from the posterior margin, and widening out in front they join the postero-lateral margin of the shield ; the festoons are very distinct. *Ventral surface* has grooves well formed, punctuations fine, a very few short hairs ; stigmatic plates wide, sub-triangular (oval with an outer prolongation), whitish in colour. *Rostrum* (VII, *h*) 1.2 mm. long ; dorsal surface of base nearly three times as wide as long, half as wide as the dorsal shield ; lateral projecting angles near the middle of the length, the posterior angles wide, and not projecting, scarcely passing beyond the margin ; porose areas oval, nearly twice as long as wide, parallel, separated by a distance equal to their small diameter ; hypostome as in the male ; palpi more than twice as wide as long ; article II longer than wide, and longer than article III, prolonged in a short retrograde spine on its posterior ventral margin. *Legs* long, not so strong as those of the male ; coxae I as in the male, spines just as strong ; coxae II, III and IV with two short flat spines, diminishing in size from coxae II to IV, on the last of which they are small and widely separated (VII, *i*), article II of the first pair of legs, as in the male ; the other articles (tarsi included) larger and not so thick as in the male.

*Hosts*.—Hedgehog (*Erinaceus frontalis*, Bennett).

*Habitat*.—Pienaar's River and Pretoria, Transvaal.

The type specimens of this species were originally collected by Dr. Gough, of the Transvaal Museum, from hedgehogs taken near Pretoria in



November, 1907. I also took specimens from a hedgehog found near Pienaar's River a few weeks later.

This genus is an intermediate form between *Rhipicephalus* and *Dermacentor*. The palpi and general form would lead one to place it in the genus *Rhipicephalus*, but the size of the posterior coxae and the absence of anal plates in the male bring it closer to *Dermacentor*. Nuttall and Warburton in 1907 described a species *Rhipicentor bicornis*, from which this genus was erected; again, early in 1908, Neumann described the same species which he called *Rhipicephalus gladiger*, not knowing that it had been previously described. Upon examining the specimens of *vicinus*, which we forwarded to him for determination, he came to the conclusion that they would warrant the establishment of a new genus; and by a rare coincidence proposed the name *Rhipicentor*. Before publication, however, he found that he had been anticipated by Nuttall and Warburton.

There are only two species in the genus, *bicornis* and *vicinus*, the latter of which is found in the Transvaal. The co-types of *vicinus* are deposited in the Transvaal Museum, Pretoria.

#### GENUS DERMACENTOR. KOCH.

*Ixodes* (ex p.), Latreille (1795).

*Dermacentor*, Koch (1844).

*Pseudixodes*, Haller (1882).

*Dermacentor*, Koch (Neumann, 1897).

Eyes present, base of rostrum wider than long, rectangular on the dorsal surface; palpi short and thick; stigmatic plates short and comma-shaped. Ventral surface of male without shields, similar to that of female. Coxae I bidentate in both sexes; coxae IV in the male very much larger than the others. *Dorsal shield* usually ornamented with various designs.

Only one species of *Dermacentor* has been reported from South Africa, *D. rhinocerotus*. I have never seen specimens of this species, but the description as given by Neumann follows:—

#### DERMACENTOR RHINOCEROTIS. (DE GEER).

##### THE RHINOCEROS TICK:

*Acarus rhinocerotis*, De Geer (1778).

*Ixodes rhinocerinus*, Denny (1843).

*Ixodes rhinocerotis*, Gervais (1844).

*Amblyomma rhinocerotis*, Koch (1844).

*Amblyomma rhinocerinus*, Koch (1844).

*Dermacentor rhinocerotis*, Gerstäcker (1873).

*Dermacentor rhinocerotis* (De Geer) (Neumann, 1897).

Plate XVI, figures o, p (a, b).

*Male*.—*Body* oval, wider behind, a little restricted at the level of the eyes. Dorsal surface (XVI, o) convex, 7 to 8 mm. long by 5 to 5.5 mm. wide; ground colour of shield clear brick red on specimens from Natal, ochre yellow or greenish yellow on those from Mozambique, spots of reddish



brown, punctuations large, not very numerous ; the dark spots limit, in front a surface in the shape of a curvilinear triangle, reddish yellow, which resembles a shield of a female, bordered by a dark colour, except on the transverse margin of the rostral emargination ; from the angles of this emargination start two short, narrow, interrupted, curved lines which limit behind a small, irregular, clear area ; eyes yellow marginal, in the dark coloured margin opposite coxae II ; eleven posterior festoons penultimate, and the ones next the median dark coloured, the other seven light coloured on all, or nearly all, of their extent ; near the margin in front and on each side two successive light coloured spots, which continue the series of the festoons ; the remainder of the shields show six light coloured spots, paired, symmetrical ; two small posterior, two large ones in front of these, two small ones, one on each side of the posterior extremities of the anterior shield-like spot ; these spots are separated by brown lines as follows :—A median and two successive transverse lines, the anterior concave behind, the posterior straight ; the light spots are sometimes of a more reddish yellow, the light coloured anterior spot is sometimes divided into two by a deep, transverse, irregular sinuous line, resulting from the extension and the anastomosing of the two curved lines which mark off the areas of the anterior angles ; sometimes a brown spot fusiform and median cuts this transverse line ; the two small anterior light spots of the posterior half join in front with the anterior shield-like spot, of which they seem to be appendages ; and punctuations are deeper. *Ventral surface* brick red or reddish brown ; sexual orifice opposite coxae II ; sexual grooves very close on account of the great size of the coxae, parallel at first, nearest together opposite coxae IV, then sharply diverging and ending near the anterior edge of the antepenultimate festoon ; anal disc brown, very prolonged backward ; stigmatic plates large, whitish. *Rostrum* 1.1 mm. long, dorsal base wider than long, posterior margin concave ; mandibles [*XVI, p (b)*] 1.75 mm. long, digit with inner apophysis elongate transversely, with two short points, outer apophysis with two teeth, one small, terminal, a little sub-ventral, the other very strong ; hypostome long, a little spatulate. Denticles in front very small and numerous, behind them six longitudinal rows of teeth of about eleven teeth to each row, followed by four rows of squamiform teeth, the outer prolonged backward ; palpi a little longer than the hypostome, wide on their dorsal surface, narrow on the ventral ; article I short, ring-like ; article II longer than wide, dorsal surface of the same colour as the shield and prolonged behind on the first article ; article III shorter than article II, almost square ; both provided with hair on their margins and dorsal surface ; article IV small, embedded in a terminal excavation of article III. *Legs* strong, reddish brown, lighter on their dorsal surfaces ; coxae regularly increasing in size from first to fourth pair, which last are very large, very close to the median line ; all coxae sprinkled with whitish hairs ; coxae I divided into two strong teeth, the outer more slender than the inner ; coxae II and III with a strong tooth near the posterior external angle ; coxae IV with two teeth, the outer of which is stronger ; articles IV, V, and especially VI, of legs with strong teeth on their lower margins ; a light coloured spot on the dorsal side of the distal end of article II of leg I, the other articles, except the tarsi, of all the legs ringed with ferruginous red on their distal ends, and with thin whitish hairs ; tarsi relatively elongate, the false articulation very close to the distal end of tarsi I, near the middle in the others ; a strong parallel spur, caruncle short, reaching scarcely the third of the length of the claws.

*Female*.—*Body* short, oval, wider behind, 7 to 8 mm. long by 4 to 5 mm. wide ; blackish brown, with the exception of the dorsal shield ; the rostrum and the legs reddish brown. *Dorsal shield* [XVI, p (a)] very large, reaching almost to the middle of the length of the body, a short oval, the posterior margin emarginate by two shallow sinuses, which divide into three not very prominent lobes, of which the median is twice the lateral ones in size ; anterior emargination for the insertion of the rostrum limited by two wide blunt points ; cervical grooves very short, transformed into two deep pits ; punctuations large, scattered in the anterior half, very fine and numerous on all the surface, which is rather shiny ; colour clear brick red on individuals from Natal, clear ochre yellow on female from Zanzibar, with two reddish brown spots occupying and bordering the two anterior cervical pits, two other irregular spots about the eyes (which are small and clear yellow) and on the lateral margin which precedes them two other irregular spots behind those of the cervical grooves. *Dorsal surface* of abdomen with a marginal groove very far from the margin, limiting more or less clearly the inner extremity of the eleven posterior festoons ; irregular grooves, one transverse, the other longitudinal, of which three are constant, a median and two close to it ; striations of integument very apparent, hairs abundant, whitish in the marginal grooves, yellow, purplish red and blood red in the posterior third, where they form two wide lateral clusters, some on the festoons. *Ventral surface* with large, whitish, scattered hairs ; sexual grooves rather separate, rendered deeper by the integumental prominences which come from the interval between the coxae, diverging at the level of coxae IV ; anus rather anterior ; ano-marginal groove relatively long ; stigmatic plates greyish white, short, comma shaped. *Rostrum* with dorsal base twice as wide as long ; its posterior angles prolonged in short points ; colour of the shield in its middle ; porose areas deep, separate, a little oval and diverging, ventral surface wide, semi-circular ; mandibles long [XVI, p (b)] ; digit with inner apophysis with three points, the median longer ; outer apophysis with three successive teeth, the terminal one a little sub-ventral, the basilar one strong and a little bent downwards ; hypostome and palpi like those of the male. *Legs* like those of the male, except that the coxae are relatively feeble, increasing a little from first to fourth pair ; the inner tooth of coxae IV is stronger than the outer.

*Hosts*.—Rhinoceros (South Africa) and some other mammals, usually found on the genitals.

*Habitat*.—Mogambique, Durban, Cape Colony, Zanzibar, Zambesi.

#### GENUS HAEMAPHYSALIS. KOCH.

*Rhipistoma*, Koch (1844).

*Goniododes*, Duges (1888).

*Opistodon*, Canestrini (1897).

*Haemaphysalis*, Koch (Neumann, 1897).

No eyes, base of rostrum rectangular, elongated transversely twice as wide as long. Palpi conical, the second article forming a strong, conical, lateral, and basilar projection. Stigmatic plates circular or short comma shaped. Ventral surface of male without anal plates ; coxae I not bifid ; coxae IV in the male of normal dimensions. Integument of uniform brownish colour.

Only one species has been reported from South Africa.

## HAEMAPHYSALIS LEACHI. AUDOUIN.

## THE DOG TICK.

*Ixodes leachii*, Audouin (1827).

*Rhipistoma leachi*, Koch (1844).

*Rhipistoma ellipticum*, Koch (1844).

*Rhipicephalus ellipticus*, Koch (1847).

*Rhipidostoma leachi*, Karsch (1879).

*Haemaphysalis leachi* (Audouin) (Neumann, 1897).

Plate XVI, figures *a* to *m*.

*Male*.—*Body* elongate, oval, a little convex on the dorsal surface; length 3 mm.; width 1.5 mm. behind the stigmata, narrower in front; colour light reddish brown. *Shield* (XVI, *l*) covers all the dorsal surface; when fully engorged sometimes a narrow line of the body is seen at its lateral margins; cervical grooves reach to level of coxae III, deep at first, then wide and shallow; a deep marginal groove, which extends far enough caudad to form the exterior margin of the three extreme caudal festoons on each side; eleven festoons present, but not always distinct on the lateral margins; punctuations numerous, fine, equal, evenly distributed over the surface. *Ventral surface* lighter coloured, yellowish, a few fine hairs and a few punctures; sexual orifice relatively wide opposite anterior edge of coxae II, an elongate plate, posterior of it; sexual grooves not very deep, diverging; anus at posterior quarter of length, large, circular; no anal plates present; anal groove somewhat V shaped, ano-marginal groove short; stigmatic plates short, comma shaped, with the lateral point well formed. *Rostrum* (XVI, *a, b*) with base rectangular, wider than long; posterior angles of dorsal surface of base prolonged backward in blunt points; mandibles (XVI, *c*) short, digit with inner apophysis thick and stout, anterior end bent in a blunt tooth, a transverse process near anterior end; outer apophysis short, stout, bearing three teeth, two terminal ones very small; palpi longer than hypostome, triangular, article I very short and narrow, hidden under article II; article II with outer angle very much prolonged, lateral and sharp, projecting beyond the base of the rostrum by half its width, bearing two retrograde points on its posterior edge, one dorsal and one ventral, provided with eight simple hairs on its ventro-median margin; article III with three simple hairs on the posterior part of the margin; its ventral surface prolonged backward in a strong, recurved tooth; article IV cylindro-conical, transverse, relatively long, terminated by seven or eight hairs; short hairs on the two surfaces of the palpi, hypostome short and wide with anterior denticles numerous; on each half are four rows of teeth, with ten or twelve in each row; teeth strong, those in each transverse row almost equal; the anterior ones a little smaller. *Legs* of medium length, same colour as body; coxae (XVI, *d*) wide and nearly contiguous, a little hairy, with a wide blunt spine near postero-median angle; tarsi relatively short; tarsi I with pseudo-articulation at distal quarter of length; all tarsi with a small terminal spur, caruncle



almost as long as the claws ; a double row of hairs on the ventral margin of the four last articles.

*Female* (unengorged).—*Body* flattened, oval, wider behind, 3.5 mm. long by 1.6 mm. wide ; colour usually light reddish brown, sometimes whitish. *Rostrum* (XVI, *e, f*), legs and shield deeper coloured. *Dorsal shield* (XVI, *m*) elongate, oval sides convex, almost equal to half the length of the body ; punctuations equal, deep and regularly distributed over the whole surface ; no eyes present ; cervical grooves deep, then shallow, concavity outward, extending almost two-thirds of length of shield ; no marginal grooves present ; cervical emargination deep, rectangular. *Dorsal surface* with numerous punctuations and a few very short hairs, with a prominent marginal groove, forming the inner margin of the three outer festoons on each side ; festoons almost square ; two short anterior grooves ; three long posterior grooves. *Ventral surface* with punctures and fine whitish hairs as on dorsal surface ; sexual orifice relatively narrow, transverse with a surrounding ring, elongated from front to back, situated opposite coxae II ; sexual grooves not very deep, concave and diverging from their origin ; anal groove somewhat V shaped ; ano-marginal groove larger than in male, equal to about a quarter of the length of the body ; posterior festoons very distinct ; anus large, circular, five spines on each valve and near the circumference ; stigmatic plates whitish, short, comma shaped, almost circular. *Rostrum* slightly shorter than that of male ; base a little shorter than that of the male, and posterior angles of dorsal base not quite so large ; porose areas well separated, rounded ; mandibles (XVI, *g*) longer, inner apophysis at digit not so thick as in male, and transverse process lunate in shape, opening outward ; outer apophysis with six teeth, two basal ones large, four anterior ones small and arranged on a separate articulated apophysis ; hypostome as in male, only there may be five rows of teeth on each half instead of four ; palpi longer and narrower than in those of male, no retrograde tooth on the ventral side of article II. *Legs* as in male, except the tarsi are longer, and the terminal spine is not so strong ; coxae are not so wide, and the spines are not so strong as in the male ; caruncle reaches only three quarters of the length of the claws.

When *engorged*, the body is ovoid, of a bluish or greyish brown colour, and often attains a length of 11 mm. by 7.5 mm. in width. The grooves of the unengorged female disappear, and in their place we have faintly indicated dotted lines ; on the dorsal surface two anterior, short, and diverging grooves, and three long posterior grooves, the median of which is straight, while the laterals have their convexity inward ; on the ventral surface are the genital grooves, ano-marginal grooves, and two very short grooves on each side of the ano-marginal groove ; on account of the swelling of the body the genital opening becomes shifted anteriorly to a position opposite coxae I.

*Nymph* (unengorged).—*Body* elongate, elliptical ; colour dark chestnut brown ; length 1.5 mm., width 1 mm. *Dorsal surface* bears a marginal furrow as in the female ; festoons well marked, three prominent dorsal grooves, deep and of equal length. *Shield* dark brown ; pentagonal in shape ; as wide as long ; widely rounded behind ; punctuations fine and evenly distributed ; no eyes ; cervical grooves not very deep, straight and extending to posterior margin. *Ventral surface* lighter in colour ; festoons



prominent ; anus at posterior third of length of body, four spines on each valve, three on circumference and one near opening ; anal groove V shape ; no genital pore ; genital grooves beginning opposite coxae III, diverging and extending to penultimate festoonal grooves ; stigmatic plates slightly elongate, transversely, very far caudad of coxae IV ; apparently a pair of stigmatic openings opposite first inter-coxal space, near lateral margin. *Rostrum* (XVI, *h*, *i*) dorsal base narrow, twice as wide as long ; posterior points not prominent ; article I of palpi concealed ; article II wider than long, projecting sharply laterally backward, projecting tooth on dorsal surface blunt and wide, on ventral side sharper and longer ; article III conical and pointed at tips ; article IV papilliform, in a pit on the ventral side of article III ; hypostome spatulate, with two rows of teeth on each half ; mandibles (XVI, *k*), with inner apophysis lunulate, outer apophysis with two large teeth surmounted by two small teeth on a separate articulation. *Legs* slender ; coxae wide ; rectangular : a very large blunt spine on posterior edge of coxae I, a very faint spine on coxae II, III, and IV ; tarsi elongate, no terminal spur.

*Larva* (unengorged).—*Body* broadly ovate, widely rounded behind, length 0.5 mm. ; width 0.3 mm ; colour light yellowish ; caudal festoons well marked. *Dorsal shield* wider than long, covers anterior third of body ; cervical grooves faint ; punctuations fine and evenly distributed ; no eyes. *Rostrum* with base narrow, wider than long ; posterior angles not prominent ; palpi as wide as long ; article I concealed, article II as in nymph ; articles III and IV as in nymph ; hypostome as in nymph ; anus near posterior margin. *Ventral surface* with stigmatic openings as follows :—One pair behind coxae I, another behind coxae II, and a third behind coxae III. *Legs* stout ; coxae rectangular, contiguous short tooth on coxae I ; tarsi slender, no terminal spur.

*Eggs* of small size ; light greyish in colour ; elliptical in outline, surface smooth and shining ; about 0.5 mm. long by 0.3 mm wide.

*Hosts*.—Dog, cat, ox, leopard, lion, genet, civette (*Felis pardus*), hedgehog (*Erinaceus frontalis* in Transvaal), jackal (*Felis tigris*), carnivora in general, and in New South Wales it has been taken on horses and cattle. At Pretoria several nymphs were taken from the field rat, *Aricanthus pumilio*, and one nymph from a tortoise.

*Habitat*.—Egypt, Eastern Ethiopia, Abyssinia, Mahal, Korz Mountains, Algeria, Sierra Leone, French Congo, Congo, Cameroon Mountains, Cape Colony, Orange River Colony, Transvaal, Mozambique, German East Africa, New South Wales (probably a variety).

This is the commonest tick found on the dog in South Africa. Lounsbury says it is confined to the grass veld districts and the coast veld of Cape Colony, but I have found it in nearly every part of the Transvaal, in both grass veld, bush veld, and low veld. It attacks nearly all carnivora, but rarely any other group of mammals, being found only very rarely on cattle, even where most abundant. It transmits the distemper or malignant jaundice of dogs.

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## ANIMALS WHICH ACT AS HOSTS FOR SOUTH AFRICAN TICKS.

## I.—MAN.

*Argas persicus.*  
 „ *vespertilionis.*  
*Ornithodoros savignyi.*  
 „ „ *caecus.*  
 „ „ *pavimentosus.*  
 „ *talaje capensis.*  
*Hyalomma aegyptium.*  
 „ „ *impressum.*  
*Ixodes pilosus.*  
*Rhipicephalus appendiculatus.*  
*Amblyomma hebraeum.*

## II.—DOMESTIC ANIMALS.

CATTLE.—*Ixodes pilosus.*

*Ornithodoros savignyi.*  
 „ „ *caecus.*  
 „ „ *pavimentosus.*  
*Hyalomma aegyptium.*  
 „ „ *impressum.*  
*Rhipicephalus sanguineus.*  
 „ *punctatissimus.*  
 „ *evertsi.*  
 „ *oculatus.*  
 „ *capensis.*  
 „ *appendiculatus.*  
 „ *bursa.*  
 „ *simus.*  
 „ *duttoni.*  
*Margaropus annulatus decoloratus.*  
 „ „ *australis.*  
*Amblyomma hebraeum.*  
 „ „ *eburneum.*  
 „ *marmoreum* (larvæ and nymphs).  
*Haemaphysalis leachi.*

HORSE.—*Ixodes pilosus*

*Hyalomma aegyptium.*  
 „ „ *impressum.*  
*Margaropus annulatus decoloratus.*  
 „ „ *australis.*  
 „ *lounsburyi.*  
*Rhipicephalus sanguineus.*  
 „ *capensis.*  
 „ *appendiculatus.*  
 „ *bursa.*  
 „ *simus.*  
 „ *evertsi.*  
 „ *lunulatus.*  
*Amblyomma hebraeum.*  
 „ *variegatum.*

ASS.—*Hyalomma aegyptium.*

„ „ *impressum.*  
*Margaropus annulatus decoloratus.*  
*Rhipicephalus evertsi.*  
 „ *bursa.*  
*Amblyomma hebraeum.*

MULE.—*Ixodes pilosus.*

*Hyalomma aegyptium.*  
 „ „ *impressum.*  
*Rhipicephalus evertsi.*  
 „ *appendiculatus.*  
*Amblyomma hebraeum.*  
 „ *variegatum.*



SHEEP.—*Ornithodoros savignyi*.  
 „ „ *caecus*.  
 „ „ *pavimentosus*.  
*Ixodes pilosus*.  
 „ *rubicundus*.  
*Hyalomma aegyptium*.  
 „ „ *impressum*.  
*Rhipicephalus sanguineus*.  
 „ *appendiculatus*.  
 „ *bursa*.  
 „ *evertsi*.  
 „ *simus*.  
*Margaropus annulatus decoloratus*.  
*Amblyomma hebraeum*.  
 „ *variegatum*.

GOAT.—*Ornithodoros savignyi*.  
 „ „ *caecus*.  
*Ixodes pilosus*.  
*Hyalomma aegyptium impressum*.  
*Margaropus annulatus decoloratus*.  
*Rhipicephalus capensis*.  
 „ *appendiculatus*.  
 „ *simus*.  
*Amblyomma hebraeum*.  
 „ *variegatum*.  
 „ *marmoratum* (larvæ and nymphs).

FIG.—*Ixodes pilosus*.

DOMESTIC DOG.—*Ixodes pilosus*.  
 „ „ *howardi*.  
*Ornithodoros savignyi caecus*.  
*Hyalomma aegyptium*.  
 „ „ *impressum*.  
*Margaropus annulatus decoloratus*.  
*Rhipicephalus sanguineus*.  
 „ *bursa*.  
 „ *evertsi*.  
 „ *punctatissimus*.  
 „ *appendiculatus*.  
 „ *simus*.  
 „ *capensis*.  
 „ *lunulatus*.  
*Amblyomma hebraeum*.  
*Aponomma exornatum*.  
*Haemaphysalis leachi*.

CAT.—*Ixodes pilosus*.  
 „ „ *howardi*.  
*Rhipicephalus sanguineus*.  
*Hyalomma aegyptium*.  
*Haemaphysalis leachi*.

FOWLS.—*Argas persicus*.  
 „ *vespertilionis* (probably).  
 „ *transgariëpinus* (probably).  
*Ornithodoros savignyi*.  
 „ „ *caecus*.  
 „ „ *pavimentosus* (not very readily).  
 „ *talaje capensis*.  
*Hyalomma aegyptium impressum* (larvæ and nymphs).  
*Amblyomma hebraeum*.

DUCKS, GEESE, TURKEYS, PIGEONS, CANARIES.—

*Argas persicus*.

Probably all those mentioned under Fowls.

## III.—WILD ANIMALS.

## CARNIVORA.

LION (*Felis leo*).—

*Haemaphysalis leachi*.  
*Rhipicephalus sanguineus*.  
*Amblyomma hebraeum eburneum*.  
*Rhipicephalus simus*.

LEOPARD (*Felis pardus*).—

*Haemaphysalis leachi*.  
*Ixodes pilosus*.

BLACK-FOOTED WILD CAT (*Felis nigripes*).—

*Haemaphysalis leachi*.

CIVETTE (*Viverra civetta*).—

*Haemaphysalis leachi*.

GENET (*Genetta felina*?)—

*Rhipicephalus sanguineus*.  
*Haemaphysalis leachi*.

MEERKAT (*Cynictis penicillata*).—

*Haemaphysalis leachi*.

CAPE HUNTING DOG (*Lycan pictus*).—

*Amblyomma hebraeum*.  
*Rhipicephalus simus*.  
 „ *nitens*.

DELANDES FOX (*Otocyon megalotis*).—

*Rhipicephalus sanguineus*.

JACKAL (*Canis sp.*).—

*Rhipicephalus simus*.  
*Haemaphysalis leachi*.

## UNGULATA.

BUSHBUCK (*Tragelaphus scriptus*).—

*Ixodes pilosus* (C.C.)

WATERBUCK (*Cobus ellipsiprymnus*).—

*Rhipicephalus sanguineus*.

REED BUCK (*Cervicapra arundinum*).—

*Rhipicephalus evertsi*.  
*Hyalomma aegyptium*.

## ANTELOPES of various species—

*Hyalomma aegyptium*.  
*Amblyomma hebraeum eburneum*.  
*Rhipicephalus evertsi*.  
 „ *appendiculatus*.

CAPE BUFFALO (*Bos caffer*).—

*Amblyomma hebraeum*.  
*Rhipicephalus appendiculatus*.

GIRAFFE (*Giraffa capensis*).—

*Amblyomma hebraeum*.  
*Hyalomma aegyptium impressum*.  
*Rhipicephalus evertsi*.

HIPPOPOTAMUS (*Hippopotamus amphibius*).—

*Amblyomma hippopotamense*.

RHINOCEROS (*Rhinoceros sp.*).—

*Amblyomma hebraeum*.  
 „ *marmoreum*.  
 „ *crenatum*.  
*Dermacentor rhinocerotis*.

BUSH PIG (*Potamochoerus choeropotamus*)—*Hyalomma aegyptium*.*Rhipicephalus simus*.ELEPHANT (*Elephas africanus*)—*Amblyomma hebraeum*.ZEBRA (*Equus* sp.)—*Amblyomma variegatum*.

## RHODENTIA.

STRIPED MOUSE (*Avicanthis pumilio*)—*Haemaphysalis leachi* (nymph).*Rhipicephalus sanguineus* (?) (nymph).CAPE HARE (*Lepus capensis*)—*Hyalomma aegyptium impressum* (all stages, but especially larvæ and nymphs).*Rhipicephalus sanguineus*.,, *appendiculatus*.,, *evertsi*.

## CHIROPTERA.

BAT (*Rhinolophus augur*)—*Ixodes pilosus howardi*.BAT (*Miniopterus schreibersi*)—*Argas vespertilionis* (Pretoria).

## INSECTIVORA.

HEDGEHOG (*Erinaceus frontalis*).*Ixodes pilosus howardi*.*Rhipicephalus sanguineus*.,, *bursa*.,, *simus*.,, *lunulatus*.*Rhipicentor vicinus*.*Haemaphysalis leachi*.

## AVES.

OSTRICH (*Struthio australis*)—*Argas persicus*.*Amblyomma hebraeum*.*Hyalomma aegyptium impressum* (all stages).SECRETARY BIRD (*Serpentarius secretarius*)—*Argas persicus*.OWL (*Strix flammea*)—*Rhipicephalus lunulatus*.PENGUIN (*Spheniscus demersus*)—*Ornithodoros talaie capensis*.QUAIL (*Coturnix capensis*)—*Amblyomma marmoreum* (larvæ).LARK, THICK-BILLED (*Calendula crassirostris*)—*Hyalomma aegyptium impressum* (nymphs).KORHAAN (*Otis* sp.)—*Hyalomma aegyptium impressum* (nymphs).RINGED PIGEON (*Turtur semitorquatus*)

## REPTILIA.

IGUANA (*Varanus niloticus*)—*Aponomma exornatum*.*Amblyomma hebraeum carneum* (Zanzibar).

LIZARD (*Varanus sp.*)—

*Aponomma exornatum.*

LIZARD (Species unknown)—

*Amblyomma marmoreum* (larvæ).

MAMBA (*Dendraspis angusticeps*)—

*Aponomma laevis capensis.*

PYTHON (*Python sebae*).

*Aponomma exornatum.*

*Neumaniella transversale.*

SNAKES (Species unknown)—

*Aponomma laevis capensis.*

*Aponomma latum.*

*Amblyomma marmoreum.*

TORTOISE (Species unknown)—

*Amblyomma marmoreum.*

„ *sylvaticum* (C.C.)

## RELATION OF SOUTH AFRICAN TICKS TO DISEASE.

DISEASE.	HOST.	ORGANISM CAUSING DISEASE.	TRANSMITTED BY.
Redwater Texas Fever Bovine Piroplasmosis	Cattle	<i>Piroplasma bigeminum</i>	<i>Margaropus annulatus</i> <i>decoloratus</i> <i>M. annulatus australis.</i>
East Coast Fever Rhodesian Redwater	Cattle	<i>Piroplasma parvum</i>	<i>Rhipicephalus appendiculatus</i> „ <i>capensis</i> „ <i>evertsi</i> „ <i>simus</i> „ <i>nitens</i>
Distemper Malignant Jaundice Biliary Fever of Dog Canine Piroplasmosis	Dog	<i>Piroplasma canis</i>	<i>Haemaphysalis leachi</i>
Biliary Fever Equine Piroplasmosis	Horse Mule Donkey	<i>Piroplasma equi</i>	<i>Rhipicephalus evertsi</i>
Heartwater	Sheep Goats Cattle	Unknown	<i>Amblyomma hebraeum</i>
Spirillosis	Cattle	<i>Spirochaeta theileri</i>	<i>M. annulatus decoloratus</i>
Human Tick Fever	Man	<i>Spirochaeta duttoni</i>	<i>Ornithodoros savignyi caecus</i>



## A NEW SPECIES OF TICK FROM THE TRANSVAAL.

By Professor L. G. NEUMANN, of Toulouse.

### RHIPICENTOR VICINUS, *n. sp.*

*Male*.—*Body* sub-oval, wider near the posterior third, slightly constricted behind the eyes, 6 mm. long (rostrum included), 3.2 mm. wide near the posterior third. *Dorsal shield* slightly convex, shining, chestnut brown in colour, without spots, a narrow margin of the abdomen showing beyond the shield, in the posterior two thirds; cervical grooves deep and wide, spreading out widely, marginal groove commencing behind the eyes, deep, rather close to the margin, terminating in the groove between the two last festoons; punctuations large, sub-equal, not very numerous, very distant from each other, arranged in lines near the lateral margins, one to two punctuations on each festoon; more numerous in front of the eyes; in front of the festoon a crescent-shaped depression, marked by fine punctuations. Eyes flat, yellowish, marginal, three small punctuations forming a border on the inner side. *Ventral surface* reddish yellow, with a few very short hairs. *Anal groove* semi-circular, opening to the front, supported behind by a single ano-marginal groove which terminates at the median festoon; genital grooves diverging widely behind coxae IV; ventral festoons well marked, wider than long, no groove limiting them in front. No caudal prolongation. Peritremes of a medium size, comma shaped, with the prolongation extending postero-dorsally. *Rostrum* 0.92 mm. long (from the tip of the palpi to the point of the posterior angles). Dorsal surface of the base twice as wide as long, lateral angles near the anterior third, very sharp and projecting, the posterior angles prominent but not spiniform, prolonged in front by a slight projection, which bounds a depression on the dorsal surface almost equal to a third of the width. *Hypostome* wide, slightly spatulate, six rows of strong teeth present. Palpi as wide as long, convex on their external edges; the first article scarcely visible, the second nearly twice as wide as long, prolonged in a strong, retrograde spine on its postero-ventral margin, and bearing a fringe of whitish hairs on the inner ventral margin; the third article without ventral spines; the fourth article small and hidden in the pit of the third article. *Legs* strong. Coxae I as long as the dorsal surface of the rostrum, divided into two strong, sub-equal contiguous spines which form three-quarters of their length; coxae II and III divided on their posterior margins into two flat, sharp spines, which are as wide as long; coxae IV large, almost as wide as long, provided on their posterior margins with two long, narrow sub-equal spines, well separated from each other, the inner one a little larger, not as long as the coxa. Second article of the first pair of legs provided near the distal extremity with a spine, dorsal, retrograde, flat, aliform, and as wide as long. The third, fourth, and fifth articles short and thick, but more slender than those of *R. bicornis*. Tarsi small, sloping at the distal end, with a small spur and weak claws.

*Female*.—*Body* oval, 6 mm. long (rostrum included), 3 mm. wide, sides convex. *Shield* scarcely longer (2.5 mm.) than wide (2.3 mm.), irregularly oval, deep chestnut brown; cervical grooves deep in front, prolonged almost to the posterior margin; lateral grooves deep and wide, each joining the corresponding cervical grooves in front and behind, and formed by punctuations in lines; punctuations large, not very numerous, more numerous outside of the lateral grooves, about a score in the median area; a few very fine punctuations near the lateral margins. Eyes similar to those of the male, situated slightly in front of the lateral angles, bordered on the inner margin by four large punctuations. *Dorsal surface* with a few very short hairs; two deep marginal grooves; three longitudinal grooves, the median of which is confined to the posterior quarter, the other two are symmetrical, extending from the posterior margin, and widening out in front they join the postero-lateral margin of the shield; the festoons are very distinct. The *ventral surface* has the grooves well formed, punctuations fine; a very few short hairs. Peritremes wide, sub-triangular (oval with an outer prolongation), whitish in colour. *Rostrum* 1.2 mm. long. Dorsal surface of base nearly three times as wide as long, half as wide as the dorsal shield, the lateral projecting angles near the middle of the length, the posterior angles wide, and not projecting, scarcely passing beyond the margin; porose areas oval, nearly twice as long as wide, parallel, separated by a distance equal to their small diameter. *Hypostome* as in the male. Palpi more than twice as long as wide; the second article longer than wide, and longer than the third article, prolonged in a short retrograde spine on its posterior ventral margin. *Legs* long, not so strong as those of the male. Coxae I as in the male, spines just as strong; coxae II, III, and IV with two short flat spines, diminishing in size from coxae II to IV, on the last of which they are small and widely separated; second article of the first pair of legs as in the male. The other articles (tarsi included) longer and not so thick as in the male.

Described from two males and two females collected at Pretoria on *Erinaceus frontalis*, Bennett, by C. W. Howard.

#### OBSERVATIONS.

I recently described,\* under the name of *Rhipicephalus gladiger*, a species which has many characters analogous to this. I remarked then that the form and size of coxae IV of the male placed it near to *Dermacentor*; the anal shields are so slightly chitinated that one could consider them as lacking, a fact which increases the resemblance to the male *Dermacentor*. It seems that, as in that genus, the chitinous sexual organs are concentrated in coxae IV, instead of in the posterior part of the ventral surface. But the form of the rostrum, especially in the female, made me place the species in the genus *Rhipicephalus*.

In the early part of December, 1907, I received from Mr. C. W. Howard the specimens which are the types of *Rhipicentor vicinus*. In this species one cannot deny the absence of anal shields in the male, and, as Mr. Howard remarked to me, it ought to have some

\*L. G. Neumann. Notes sur les Ixodidés, VI. Archives de Parasitologie, vol XII, 1908, p. 8.

connection with a species of *Dermacentor*. A second examination of *Rhipicephalus gladiger* brought me definitely to the conclusion that the anal shields were absent. *Rhipicephalus* is, therefore, no more in question. It is apparently an intermediate form between *Rhipicephalus* and *Dermacentor*. On the 21st of December I wrote to Mr. Howard that I intended to reunite the two species in a new genus which I proposed to call *Rhipicentor*.

It seems that the same thing occurred to Messrs. Nuttall and Warburton, for, by a rare coincidence, it is the same name chosen by them in a recent work\* in which they describe, under the name of *Rhipicentor bicornis*, the species which I called *Rhipicephalus gladiger*. At the same time they gave the characters of the new genus which they establish in that paper. The publication of this work of Nuttall and Warburton having preceded my "Notes VI," it is evident that *Rhipicentor bicornis* must have the preference over *Rhipicentor gladiger*.

A comparison of the two species of the new genus show the following principal differences:—

*Rhipicentor bicornis*.

*Male*.—Base of rostrum, with posterior angles prolonged into a spine. Coxae IV with spines unequal, the inner one almost double the outer one.

*Female*.—Dorsal shield scarcely longer than wide. Palpi short. Coxae IV with spines longer than wide.

*Rhipicentor vicinus*.

*Male*.—Base of rostrum, with posterior angles simply projecting. Coxae IV with spines almost equal.

*Female*.—Dorsal shield scarcely longer than wide. Palpi long. Coxae IV with spines as wide as long.

---

\* G. H. F. Nuttall and C. Warburton. On a new genus of Ixodoidea, together with a description of eleven new species of ticks. Proc. of the Cambridge Philosophical Society, vol. XIV. 1907, p. 398.



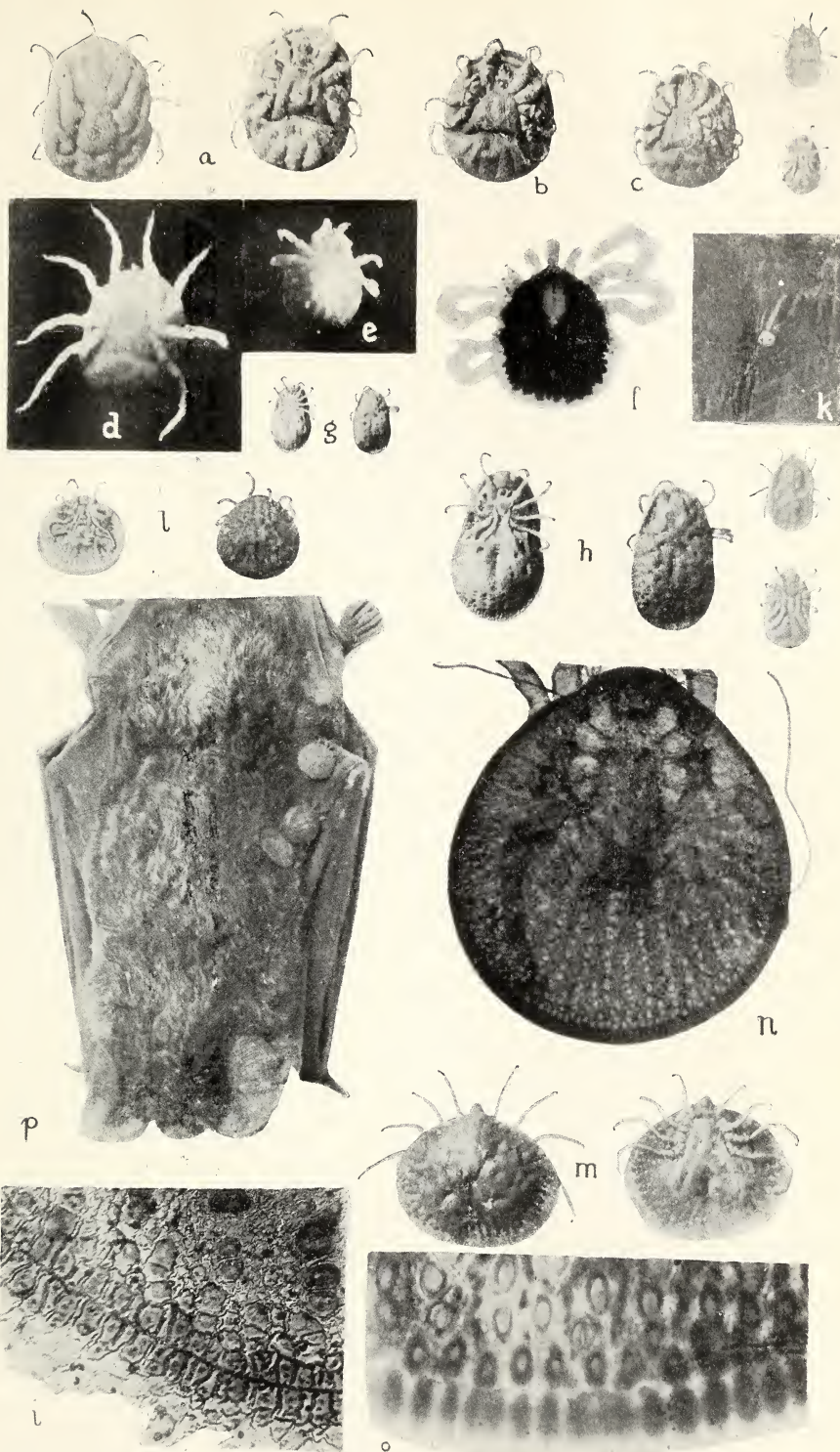


Plate I (photographs).

### Ornithodoros, Argas.

*Ornithodoros savignyi caceus*, Neumann.

(a) Dorsal and ventral surfaces of female; (b) Ventral surface of male; (c) Ventral surface of nymph.

(d) Ventral surface of nymph, just molted to octopod stage; (e) Ventral surface of larva in resting stage.

*Argas persicus*, Fischer de Waldheim.

(f) Larva; (g) Females (natural size); (h) Females enlarged; (i) Margin of body of adult.

*Argas vespertilionis*, Latreille.

(k) Larva attached to bat's wing; (l) Dorsal and ventral surface of male; (m) Dorsal and ventral surface of female; (n) Nymph, very much enlarged, showing arrangement of pits on the body; (o) Margin of body of adult, showing shape of marginal pits; (p) Adult feeding on a bat.





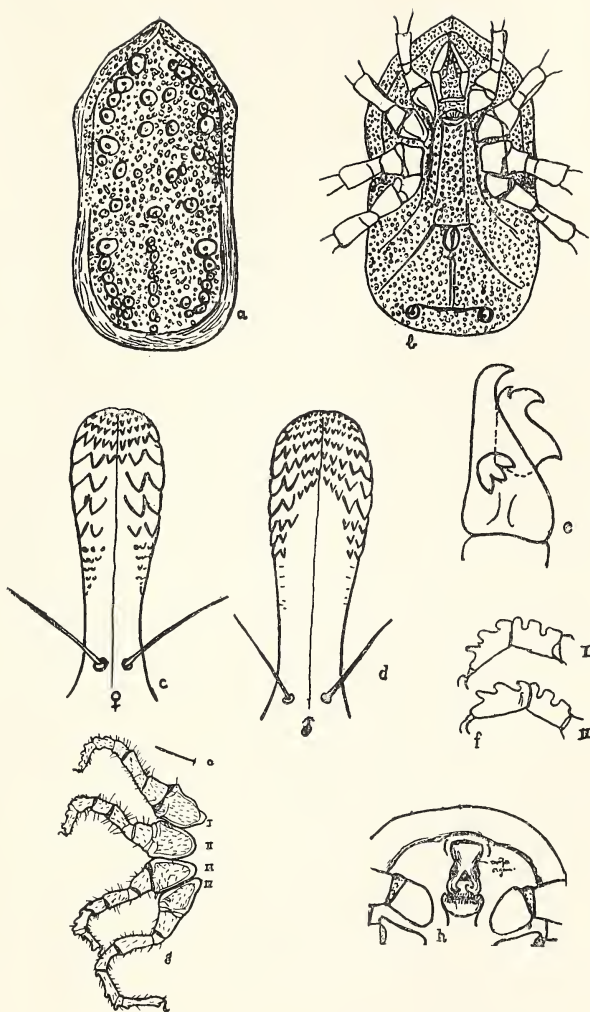


Plate III.

# **Ornithodoros.**

*O. talaje capensis*, Neumann.

(a) Dorsal surface of adult.

(b) Ventral surface of adult.

(c) Hypostome of female.

(d) Hypostome of male.

(e) Mandible of male and female.

*O. sariguyi parimentosus*, Neumann.

(f) Tarsi I and II of adult (from Neumann).

*O. sariguyi caecus*, (Neumann).

(g) Legs of adult.

(h) Ovipositing organ in position for extracting the eggs.

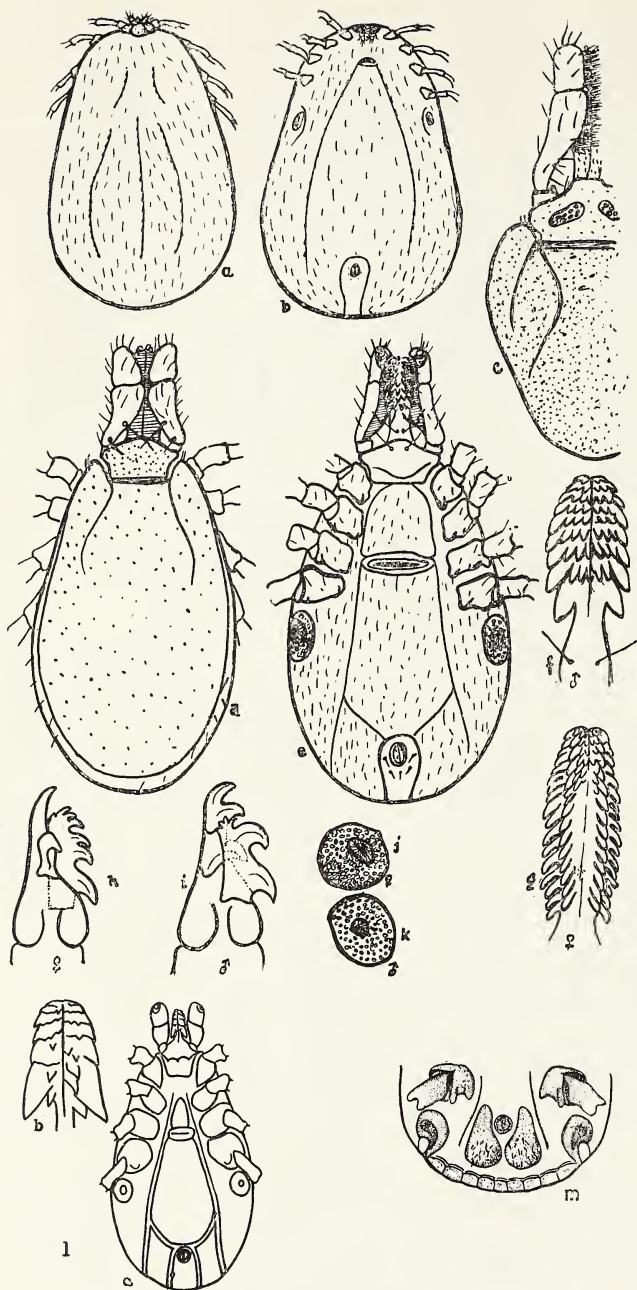


Plate IV.

# ***Ixodes, Hyalomma.***

*Ixodes pilosus howardi*, Neumann.

(a) Dorsal surface of female.

(b) Ventral surface of female.

(c) Shield and rostrum of female.

(d) Dorsal surface of male.

(e) Ventral surface of male.

(f) Hypostome of male.

(g) Hypostome of female.

(h) Mandible of female.

(i) Mandible of male.

(j) Stigmatic plate of female.

(k) Stigmatic plate of male.

(l) *Ixodes rubicundus*, Neumann (from Neumann).

(a) ventral surface of male.

(b) hypostome of male.

(m) *Hyalomma hippopotamense*, (Denny), posterior end of ventral surface (from Neumann).

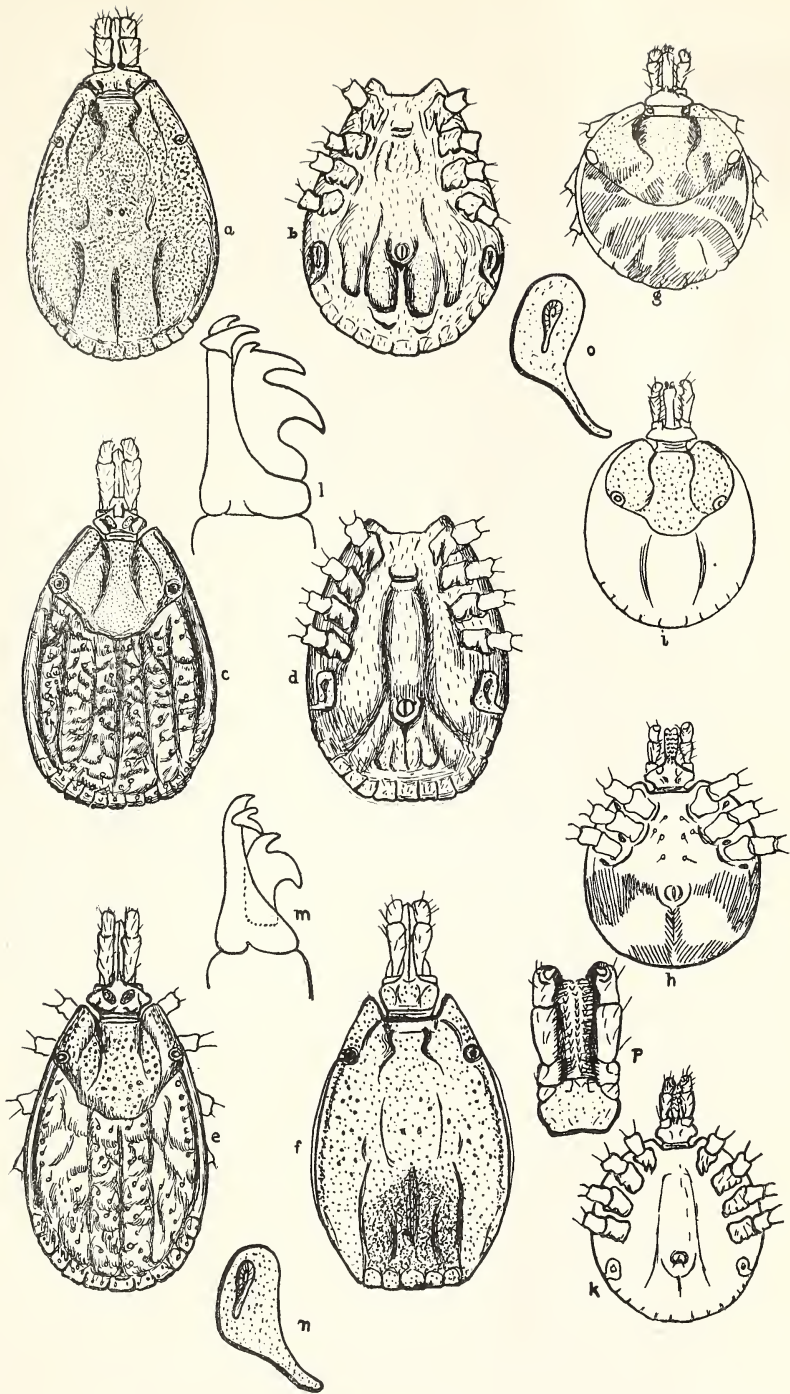


Plate V.

### Hyalomma.

*Hyalomma aegyptium* (Linnaeus).  
(c) Dorsal surface of female.

*Hyalomma aegyptium impressum*, Neumann.  
(a) Shield of male.  
(b) Ventral surface of male.  
(e) Dorsal surface of female.  
(d) Ventral surface of female.  
(g) Dorsal surface of larva.  
(h) Ventral surface of larva.  
(i) Dorsal surface of nymph.  
(k) Ventral surface of nymph.

(f) Shield of male.  
(n) Stigmatic plate of male.

(l) Mandible of female of *aegyptium impressum*.  
(m) Mandible of male of *aegyptium impressum*.  
(o) Stigmatic plate of male *aegyptium impressum*.  
(p) Ventral surface of rostrum of female *aegyptium impressum*.



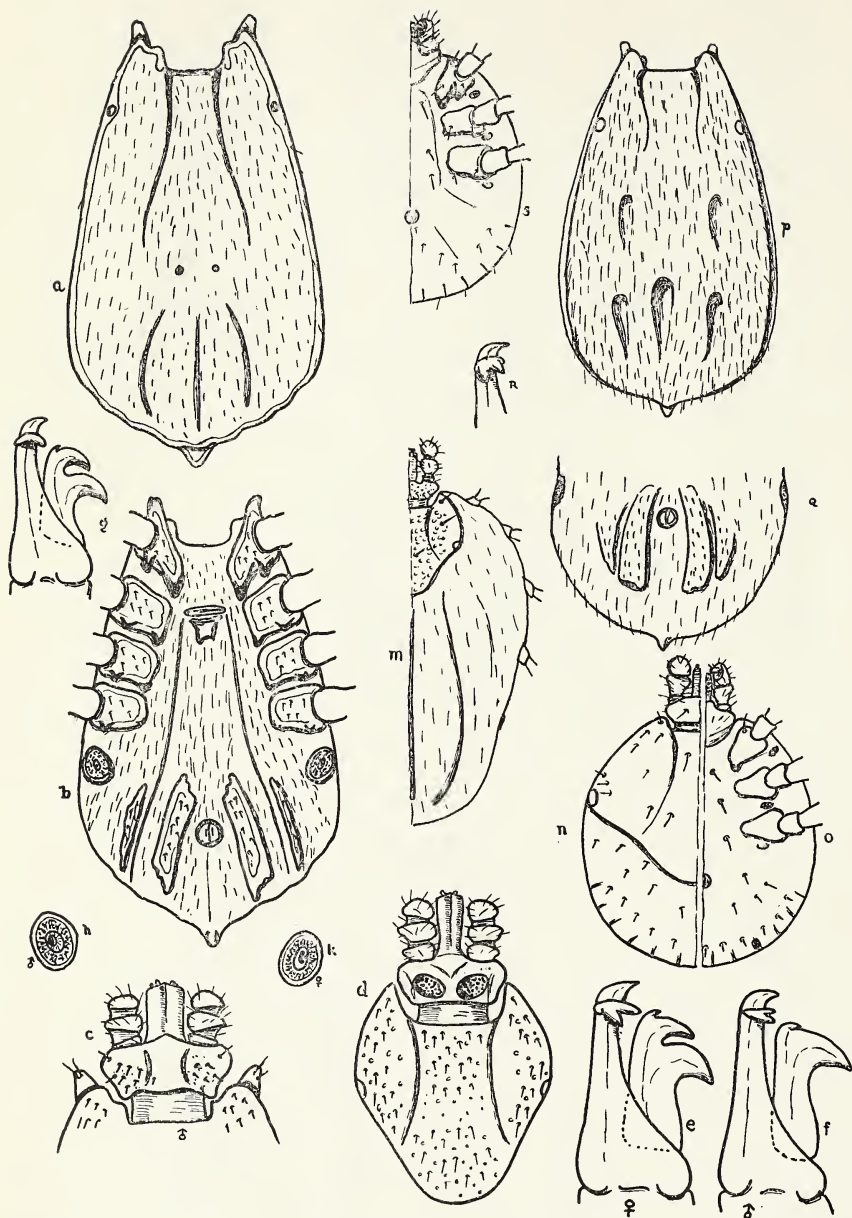


Plate VI.

### Margaropus.

*Margaropus annulatus decoloratus*, (Koch).

- (a) Dorsal surface of male.
- (b) Ventral surface of male.
- (c) Dorsal surface of rostrum of male.
- (d) Dorsal shield and rostrum of female.
- (e) Mandible of female.
- (f) Mandible of male.

(g) Mandible of nymph.

- (h) Stigmatic plate of male.
- (i) Stigmatic plate of female.
- (j) Dorsal surface of nymph.
- (k) Dorsal surface of larva.
- (l) Ventral surface of larva.

*Margaropus annulatus australis*, (Fuller).

- (m) Inner apophysis of mandible of male (redrawn from Fuller).
- (n) Ventral surface of larva (redrawn from Salmon and Stiles).

(p) Dorsal surface of male.

(q) Posterior portion of ventral surface of male.

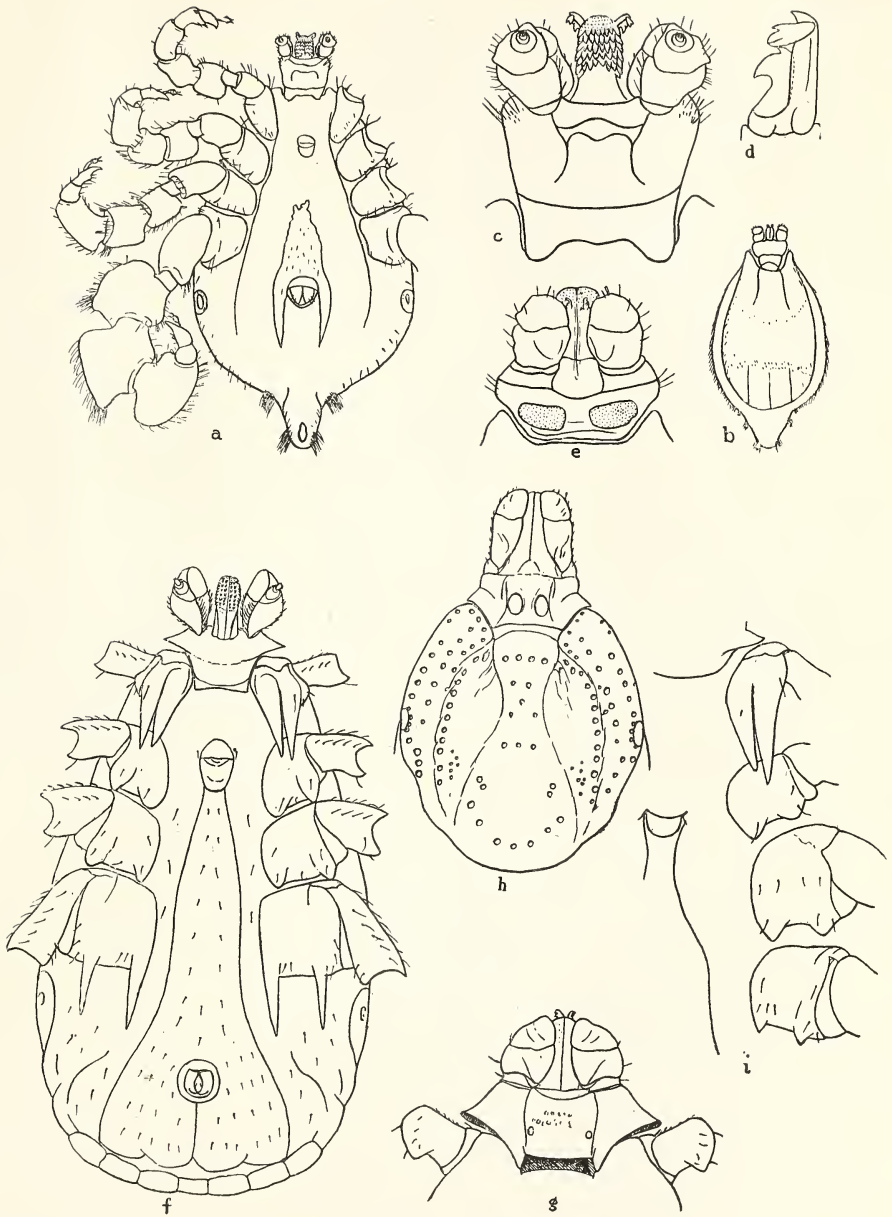


Plate VII.

**Margaropus, Rhipicentor.**

*Margaropus lounsburyi*, Neumann. (Drawings from Neumann.)

- (a) Ventral surface and legs of male.  
(b) Dorsal surface of male.

*Rhipicentor vicinus*, Neumann.

- (c) Ventral surface of rostrum of male.  
(d) Mandible of male.  
(e) Dorsal surface of rostrum of female.  
(f) Rostrum and dorsal shield of female.  
(g) Coxae I to IV of female.  
(h) Ventral surface of male.  
(i) Dorsal surface of rostrum of male.

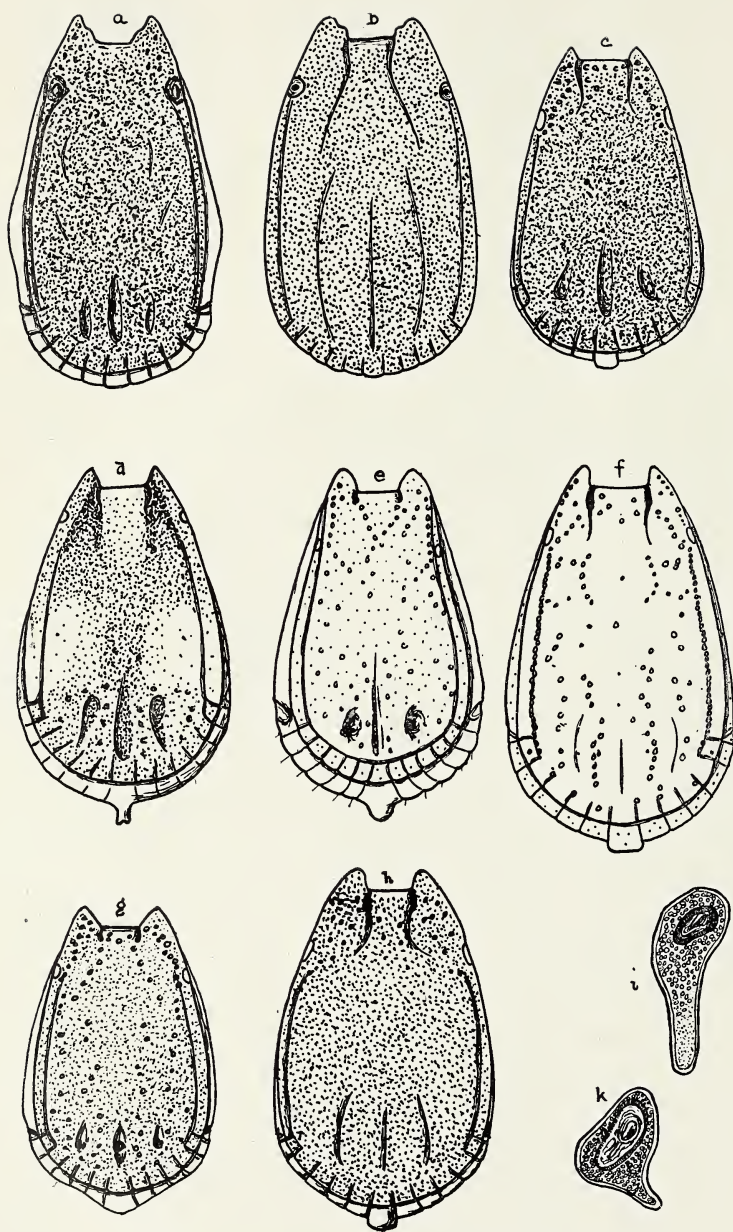


Plate VIII.

**Rhipicephalus, shields of males.**

- |   |   |
|---|---|
| (a) <i>R. evertsi</i> , Neumann.        | (g) <i>R. lunulatus</i> , Neumann.                            |
| (b) <i>R. oculus</i> , Neumann.         | (h) <i>R. bursa</i> , Canestrini and Fanzago.                 |
| (c) <i>R. capensis</i> , Koch.          | (i) Stigmatic plate of male <i>R. evertsi</i> ,<br>Neumann.   |
| (d) <i>R. appendiculatus</i> , Neumann. | (k) Stigmatic plate of female <i>R. evertsi</i> ,<br>Neumann. |
| (e) <i>R. sanguineus</i> (Latreille).   |   |
| (f) <i>R. simus</i> , Koch.             |   |

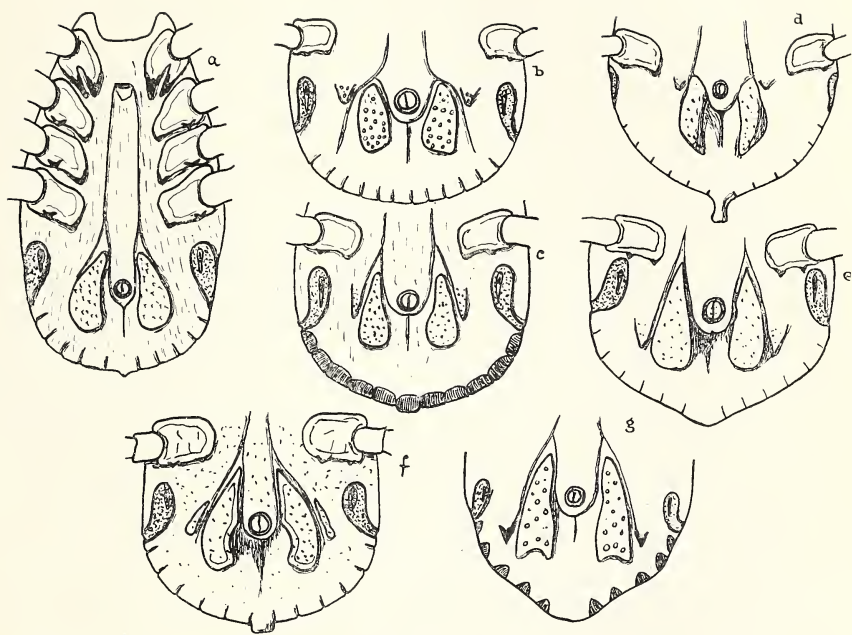


Plate IX.

**Rhipicephalus, anal plates of males.**

(a) *R. cecerti*, Neumann.

(b) *R. oculatus*, Neumann.

(c) *R. capensis*, Koch.

(d) *R. appendiculatus*, Neumann.

(e) *R. sanguineus* (Latreille).

(f) *R. simus*, Koch.

(g) *R. lunulatus*, Neumann.



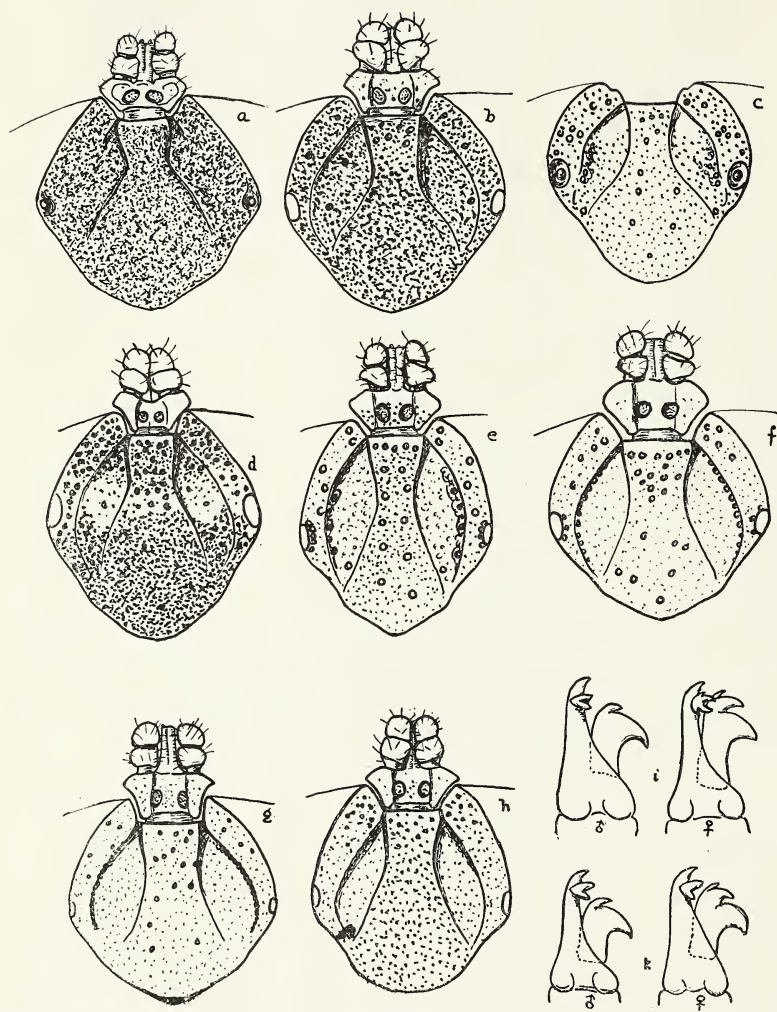


Plate X.

**Rhipicephalus, shields of females.**

- (a) *R. evertsi*, Neumann.  
 (b) *R. capensis*, Koch.  
 (c) *R. oculatus*, Neumann.  
 (d) *R. appendiculatus*, Neumann.  
 (e) *R. sanguineus* (Latreille).  
 (f) *R. simus*, Koch.

- (g) *R. lunulatus*, Neumann.  
 (h) *R. bursa*, Canestrini and Fanzango.  
 (i) Mandibles of *R. simus*, Koch, male at left and female at right.  
 (k) Mandibles of *R. sanguineus* (Latreille), male at left and female at right.

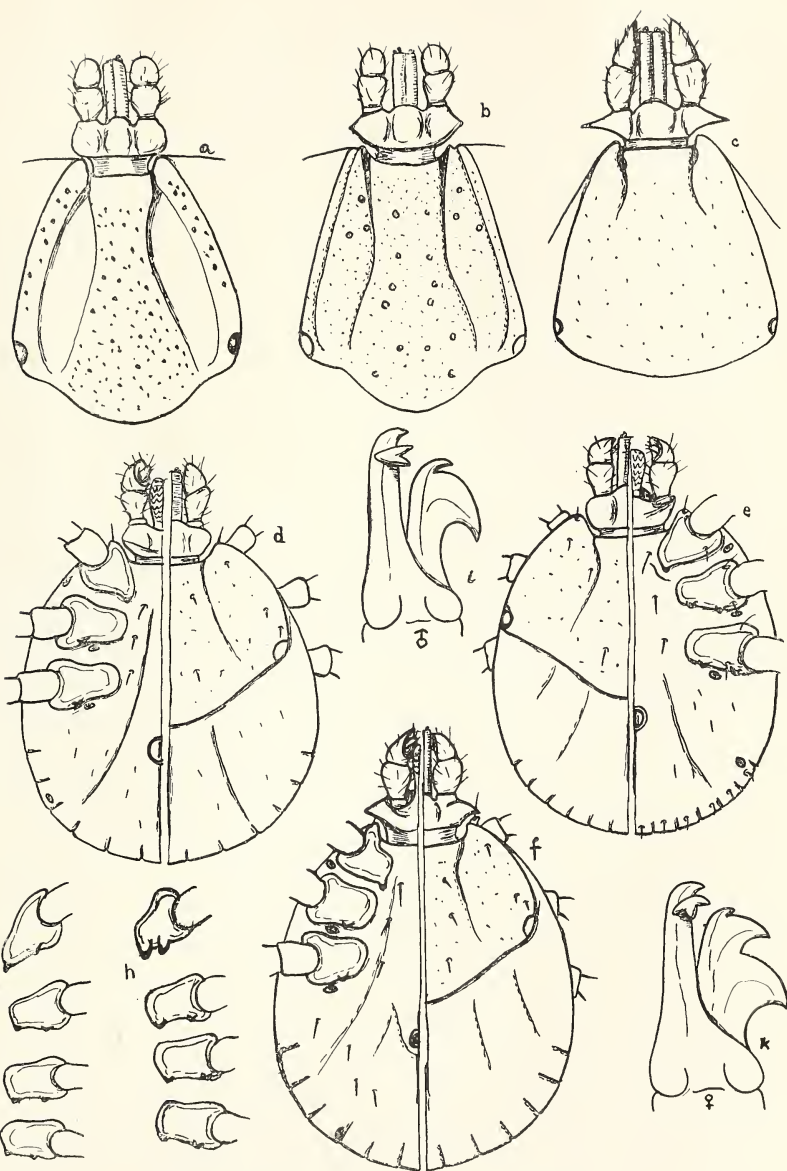


Plate XI.

**Rhipicephalus, nymphs and larvae.**

- (a) Dorsal shield and rostrum of nymph of *R. cretzi*.  
 (b) Dorsal shield and rostrum of nymph of *R. appendiculatus*.  
 (c) Dorsal shield and rostrum of nymph of *R. simus*.  
 (d) Dorsal and ventral surfaces of larva of *R. appendiculatus*.  
 (e) Dorsal and ventral surfaces of larva of *R. cretzi*.  
 (f) Dorsal and ventral surfaces of larva of *R. simus*.  
 (g) Coxae of nymph of *R. appendiculatus*.  
 (h) Coxae of nymph of *R. simus*.  
 (i) Mandibles of *R. appendiculatus*, male.  
 (k) Mandibles of *R. appendiculatus*, female, nymph and larva.

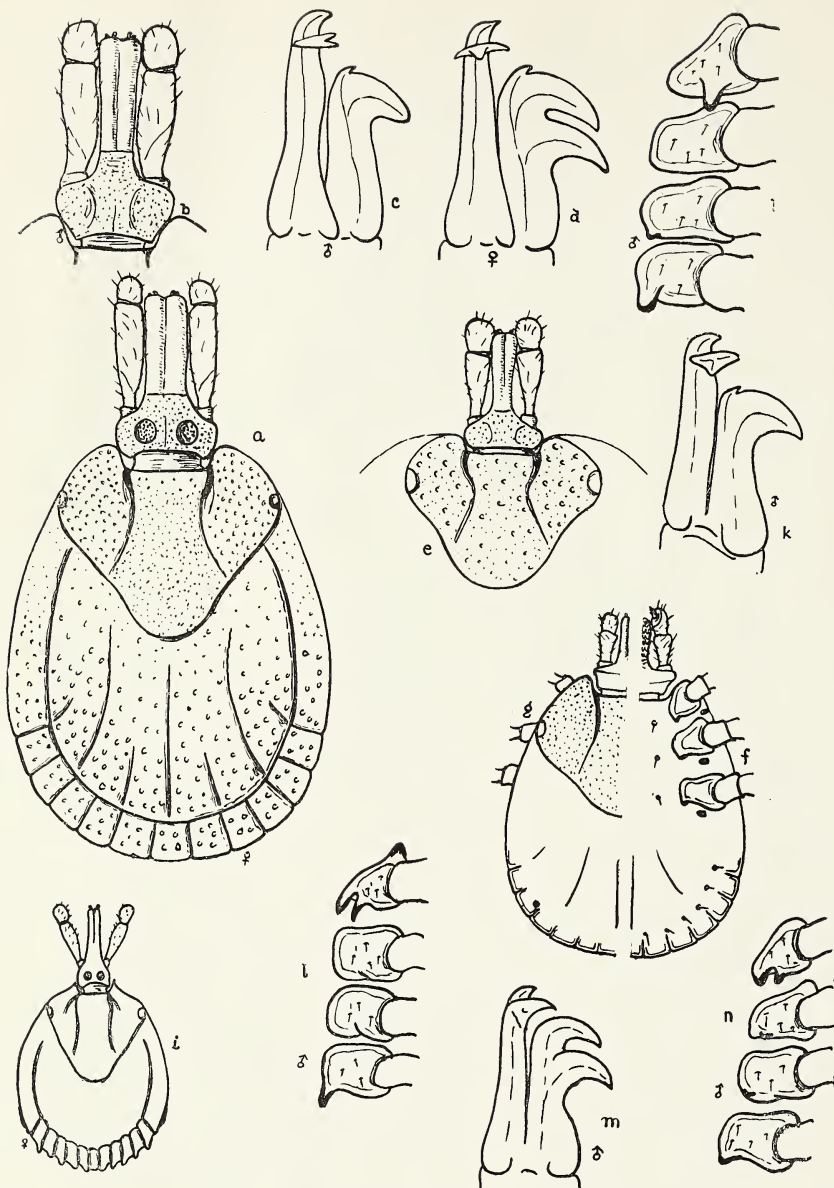


Plate XII.

### Amblyomma.

*Amblyomma hebraeum*, Koch.

- (a) Dorsal surface of unengorged female.  
 (b) Dorsal surface of rostrum of male.  
 (c) Mandible of male.  
 (d) Mandible of female.

- (e) Shield and rostrum of nymph.  
 (f) Ventral surface of larva.  
 (g) Dorsal surface of larva.  
 (h) Coxae of male.

*Amblyomma crenatum*, Neumann.

- (i) Dorsal surface and rostrum of female (redrawn from Neumann).

*Amblyomma variegatum*, (Fabricius).

- (k) Mandible of male.

- (l) Coxae of male.

*Amblyomma marmoreum*, Koch.

- (m) Mandible of male.

- (n) Coxae of male.

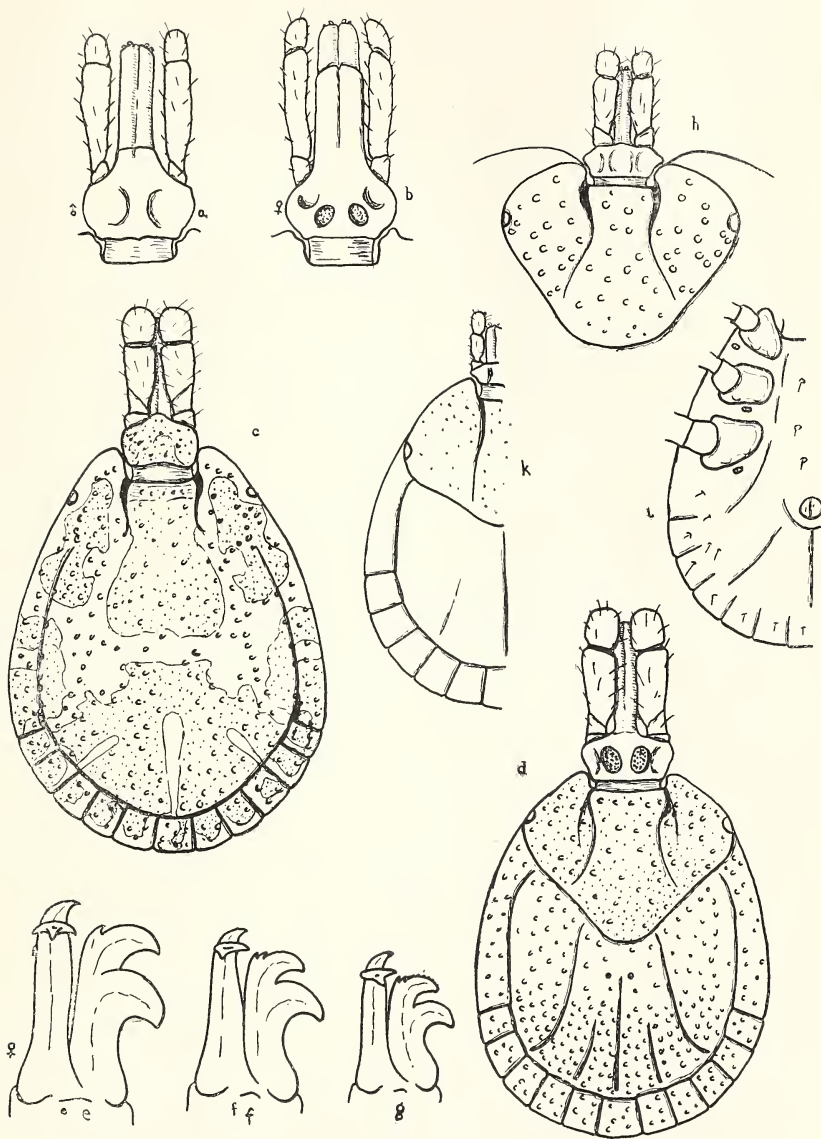


Plate XIII.

**Amblyomma**

*Amblyomma variegatum*, (Fabricius).

(a) Dorsal surface of rostrum of male (redrawn from Dönitz).

*Amblyomma marmoreum*, Koch.

(c) Dorsal surface of male.

(d) Dorsal surface of unengorged female.

(e) Mandible of female.

(f) Mandible of nymph.

(b) Dorsal surface of rostrum of female (redrawn from Dönitz).

(g) Mandible of larva.

(h) Shield and rostrum of nymph.

(i) Ventral surface of larva.

(k) Dorsal surface of larva.



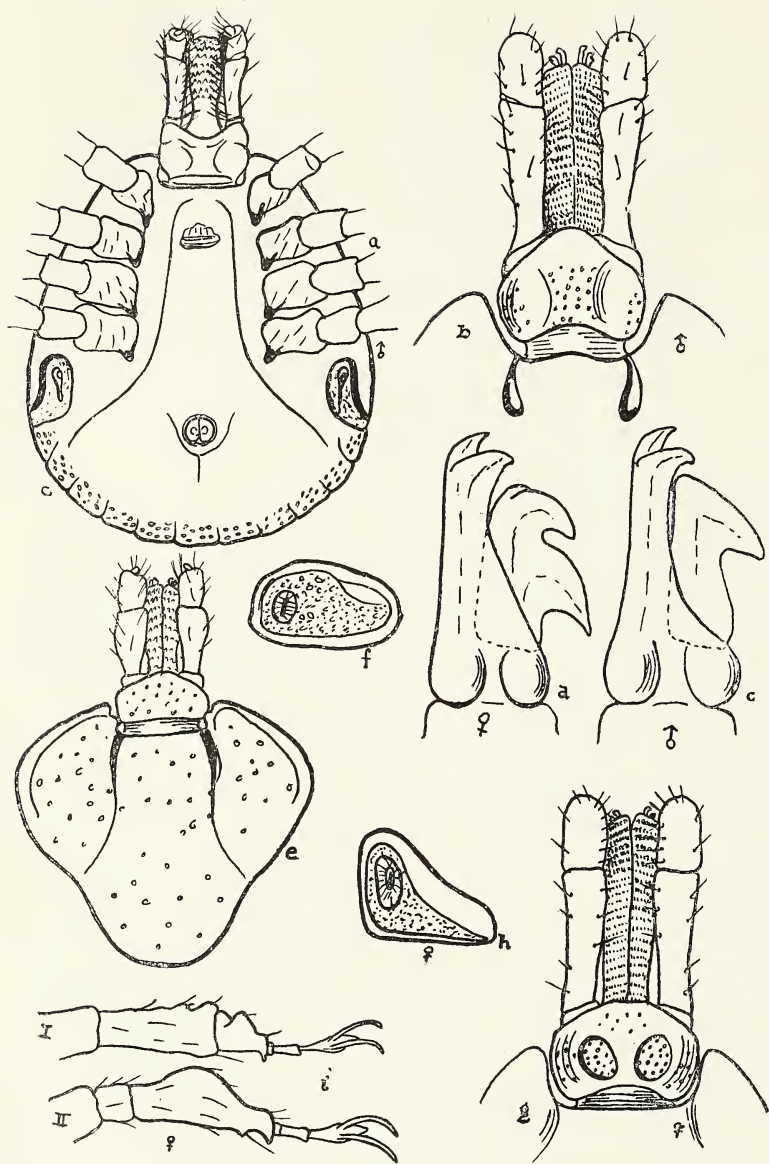


Plate XIV.

*Aponomma crenatum*, (Koch).

(a) Ventral surface of male.

(b) Rostrum of male, dorsal surface.

(c) Mandible of male.

(d) Mandible of female.

# **Aponomma.**

(e) Shield of nymph.

(f) Stigmatic plate of nymph.

(g) Rostrum of female, dorsal surface.

(h) Stigmatic plate of female.

(i) Tarsi I and II of female.

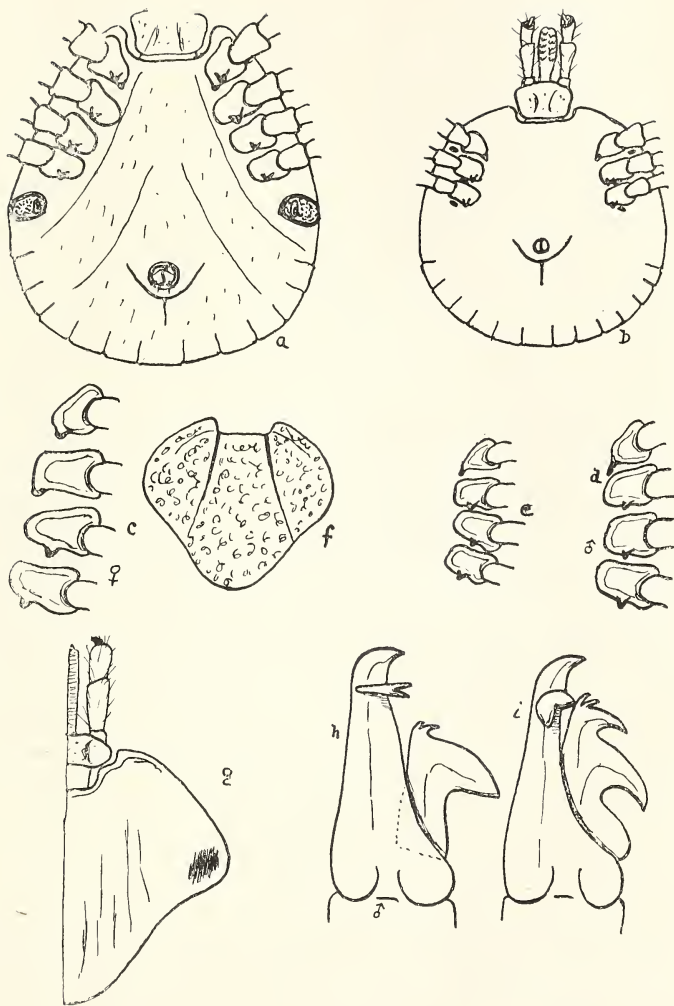


Plate XV.

*Aponomma exoriatum*, (Koch).

(a) Ventral surface of nymph.

(b) Ventral surface of larva.

*Aponomma laevis capense*, Neumann.

(d) Coxae of male.

(c) Coxae of nymph.

**Aponomma.**

(e) Coxae of female.

(f) Shield of larva.

(g) Shield of nymph.

(h) Mandible of male.

(i) Mandible of nymph.

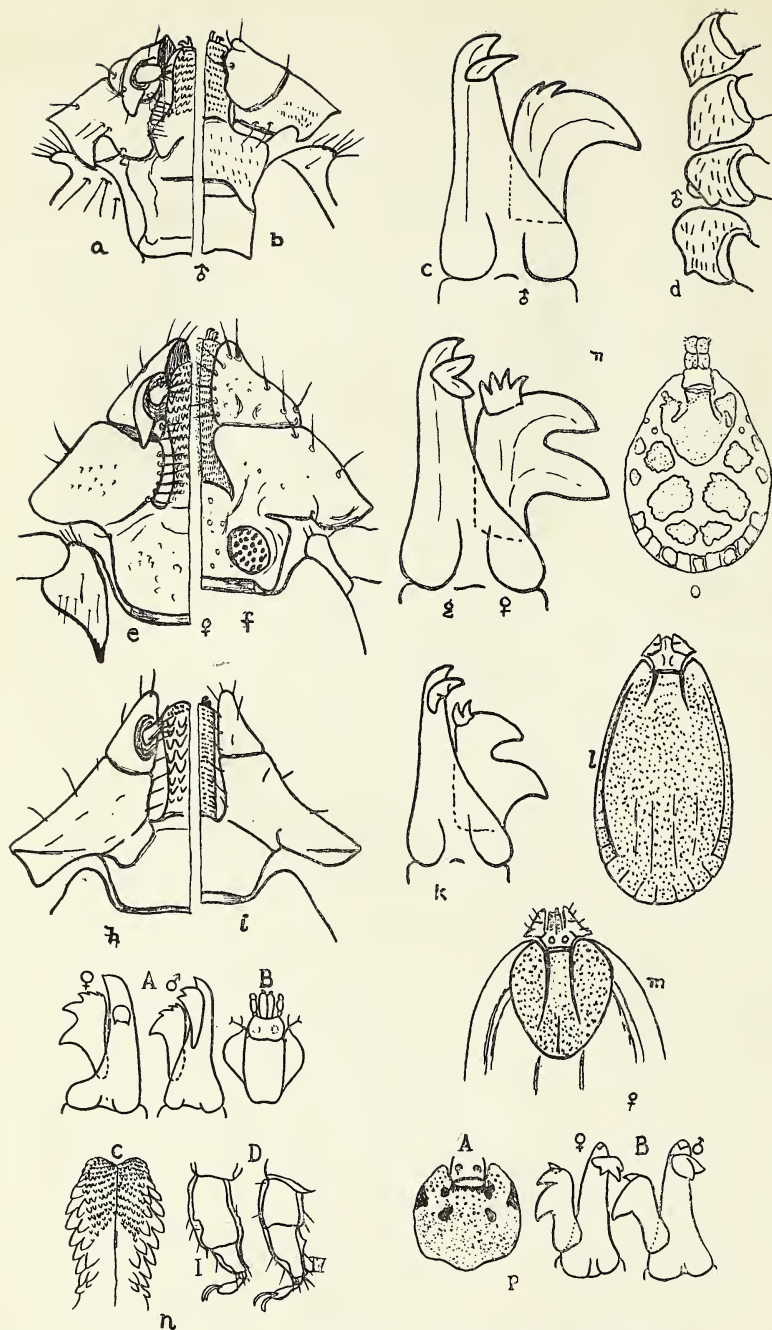


Plate XVI. **Haemaphysalis, Neumaniella, Dermacentor.**

*Haemaphysalis leachi* (Audouin).

- (a) Ventral surface of rostrum of male.
- (b) Dorsal surface of rostrum of male.
- (c) Mandible of male.
- (d) Coxae of male.
- (e) Ventral surface of rostrum of female.
- (f) Dorsal surface of rostrum of female.
- (g) Mandible of female.
- (h) Ventral surface of rostrum of nymph.
- (i) Dorsal surface of rostrum of nymph.
- (j) Mandible of nymph.
- (k) Dorsal shield of male.
- (l) Dorsal shield of female.
- (m) Dorsal shield of female.

(n) *Neumaniella transversale*, (Lucas), larva (from Neumann).

- (a) Mandibles of male and female.
- (b) Dorsal shield of female.
- (c) Hypostome of male.
- (d) Tarsi I and IV of male.

(o) *Dermacentor rhinocerotis*, (de Geer), dorsal shield of male (from Neumann).

(p) *Dermacentor rhinocerotis*, (de Geer), dorsal shield of female.

- (a) Dorsal shield of female.
- (b) Mandibles of male and female.

*SUPPLEMENT*  
TO THE  
**Annals of the Transvaal Museum, No. 2,**  
OCTOBER, 1908.

—o—  
**A NEW SHREW FROM PONDOLAND,**

By E. C. CHUBB, F.Z.S., Acting Curator Rhodesia Museum.

—o—

While engaged in working out the collection of South African shrews belonging to the Transvaal Museum I find among them two examples of a very distinct new species of *MYOSOREX*. In honour of the collector, Mr. H. H. SWINNY, it may be known as

***Myosorex swinnyi*, n. sp.**

A very dark-coloured species with a comparatively large skull. General colour of upper surface very dark brown, almost black; underside a little lighter. Hairs on back about 6 mm. long, dark slate-grey for about four-fifths of their length, followed by a ring of black, and tipped with brown, this latter giving a fine grizzled appearance to the general colour of the back. Upper sides of hands and feet black; claws light-coloured. Tail, above and below, black, with very short hairs and scarcely any tuft at tip. Skull in general characters similar to that in other members of the genus, except that the palate is lengthened anteriorly, with the result that the tooth-row measures more than in any of the other species. Main cusp of  $I^1$  scarcely exceeding  $I^2$  in downward projection.

Dimensions of the co-types (measured in the flesh), 2 females; head and body 74, 81 mm.; tail 45, 48; hind-foot, 15, 13; ear 11, 9. Skulls: back of condyle to front face of  $I^1$  23.5, 24; basal length 21, 21.5; greatest breadth across brain-case 11.2, 11.4; length of upper tooth series 11.7, 11.7.

Hab.: Port St. John's District, Western Pondoland.  
Alt. 200-feet.

Co-types: Two females. Collector's numbers 172, 173.

Collected 21st and 15th April, 1908, respectively, by Mr. H. H. Swinny.

Type is in the Transvaal Museum.



## **On a new species of *Cossypha***

FROM WEST PONDOLAND.

By Dr. J. W. B. GUNNING, Director of the Transvaal Museum.

---

Among a collection of birds collected by H. H. Swinny at Ngqeleni in West Pondoland, shot on 2.8.08, I found a specimen which at first sight I took for *Cossypha bicolor* (Sparrrn.) Closer examination, however, showed that I had to do with a new and very distinct species. In *bicolor* the sides of the face, ear coverts, and lores are black, which is entirely absent in the new species, which I desire to name after my Assistant, Mr. A. K. Haagner, the energetic Secretary of the South African Ornithologists Union.

### **"*Cossypha haagneri*."**

Description : Adult female, above, including the crown and wing coverts, bluish slate-grey, merging into orange on the rump and upper tail coverts. Lores, a broad stripe over the eyes, ear coverts, under wing and under tail coverts and entire under surface of the body uniform bright orange. Back of the neck washed with orange brown. Primaries blackish, broadly margined with bluish grey on the outer web, except the first two, which are entirely black. Tail : outer feather inner web orange, outer web dark brown, 2nd, 3rd and 4th orange, 5th orange margined near the tip with dark brown, middle feather entirely dark brown.

Bill black, iris brown, feet pinkish brown.

Length 198 mm. in the flesh, wing 93 mm., tail 91 mm., bill 15 mm., tarsus 31 mm.

The type is in the Transvaal Museum.

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ANNALS  
OF THE  
TRANSVAAL MUSEUM.

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JANUARY, 1909.

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PRETORIA :  
THE GOVERNMENT PRINTING AND STATIONERY OFFICE.



ANNALS  
OF  
*The Transvaal Museum.*

VOL. I.

JANUARY, 1909.

No. 3.

DESCRIPTION OF TWO NEW SPECIES OF BIRDS  
IN THE TRANSVAAL MUSEUM.

BY DR. J. W. B. GUNNING, Director.

ANTHREPTES REICHENOWI, sp. nov.

Description: *Male*. Above pale olive-green, a little paler on the upper tail coverts; front half of crown, chin, and throat, as far as upper breast, bright metallic indigo-blue with violet reflections; the edges of the metallic patch more inclined to steel-blue. Lores and a ring round the eye pale yellow, the former shaded with dusky. Wings olive-brown, the feathers being edged with olive-green; paler on the remiges, inner margins of the latter pale whitish-grey.

Tail olive-brown, the feathers edged with olive-yellow. Under surface yellow, strongly washed with greyish-olive, particularly on the flanks and sides of the chest. Pectoral tufts pale yellow; axillaries pale yellow; under wing-coverts white tipped with pale yellow, those on carpal bend pale yellow.

Length, 106 mm.; wing, 55.5; tail, 44.5; tarsus, 15; culmen, 15.5.

*Female*: Coloured much like the male, but is without the metallic parts, the throat and forehead being pale yellow-grey. The upper surface is slightly paler and the lower duskier than the male.

Length, 100 mm.; wing, 54; tail, 37; tarsus, 14.5; culmen, 15.

*Male*. -Mzimbiti, near Beira, Portuguese South-East Africa, 17th May, 1908. (P. A. Sheppard.)

*Female*. Mzimbiti, near Beira, Portuguese South-East Africa, 6th July, 1908. (P. A. Sheppard.)

It is somewhat difficult to know where to place this bird, as all its characters are not in accordance with the definition of the genus *Anthreptes*; the beak being distinctly curved (even the keel of the lower mandible being slightly curved).

In general appearance the bird comes nearest to the illustration of *Cinnyris reichenbachii* in Shelley's "Monograph of the Nectariniidae," but the blue is deeper and only reaches as far as the middle of the crown and does not include the ear coverts, which are olive-green. On the under surface the grey is not half so pronounced, and the tail is only slightly rounded, not graduated. It is also considerably smaller.



## HEMIPTERYX MINUTA, sp. nov.

This bird is considerably smaller than *textrix*, is not streaked on the flanks and breast, and has a comparatively shorter tail.

Description: Feathers of the upper surface blackish-brown edged with pale brown, rustier on the wings, and on the wing and upper tail-coverts. Crown reddish-brown, the bases of the feathers being darker, giving a mottled appearance. A short eyebrow, and the cheeks greyish-cream, shading into pale rusty-brown on the nape, forming an indistinct collar. Lores blackish. Under surface greyish-white, the sides of the chest dusky-brown, the flanks fawny; under tail-coverts tawny-white. Tail blackish-brown, the feathers (excepting the central pair) narrowly tipped with white. Thighs tawny-rufus.

Female: Length, 89 mm.; wing, 49; tail, 24; tarsus, 20; culmen, 9.5. Waterfalls, Haenertsburg, 5th February, 1908. (Iris tawny; bill horn above, light brown below, tip darker. Tarsus ashy-yellow. F. V. Kirby.)

Male: Length, 90 mm.; wing, 49.5; tail, 24.5; tarsus, 20; culmen, 9.5. Woodbush Forest Reserve, Zoutpansberg, 29th January, 1908. (Iris dark brown. Bill dark brown. Tarsus light pinkish-yellow. Gape olive. F. V. Kirby.)

These birds were collected by Mr. F. Vaughan-Kirby in the north-central Transvaal.

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ON A NEW SPECIES OF COSSYPHA FROM WEST PONDOLAND.

BY DR. J. W. B. GUNNING, Director of the Transvaal Museum.

Among a collection of birds collected by H. H. Swinny at Ngqeleni in West Pondoland, shot on 2nd August, 1908, I found a specimen which at first sight I took for *Cossypha bicolor* (Sparrm.) Closer examination, however, showed that I had to do with a new and very distinct species. In bicolor the sides of the face, ear coverts, and lores are black, which is entirely absent in the new species, which I desire to name after my assistant, Mr. A. K. Haagner, the energetic Secretary of the South African Ornithologists Union.

## COSSYPHA HAAGNERI, n. sp.

Description: Adult female, above, including the crown and wing coverts, bluish slate-grey, merging into orange on the rump and upper tail coverts. Lores, a broad stripe over the eyes, ear coverts, under wing and under tail coverts and entire under surface of the body uniform bright orange. Back of the neck washed with orange brown. Primaries blackish, broadly margined with bluish-grey on the outer web, except the first two, which are entirely black. Tail: Outer feather inner web orange, outer web dark brown, second, third, and fourth orange, fifth orange margined near the tip with dark brown, middle feather entirely dark brown.

Bill black, iris brown, feet pinkish brown.

Length 198 mm. in the flesh, wing 93 mm., tail 91 mm., bill 15 mm., tarsus 31 mm.

The type is in the Transvaal Museum.

DESCRIPTIONS OF THREE NEW SPECIES OF LEPIDOPTERA  
RHOPALOCERA IN THE TRANSVAAL MUSEUM.

BY C. J. SWIERSTRA, First Assistant.

In the collection of J. T. Janse, Esq., of Pretoria, I found a *Leptoneura*, unfortunately a single specimen, which is undoubtedly an undescribed species of that genus. Mr. Janse informed me that he caught it on the flat top, which forms a sort of elevated plateau, of the Warmberg, situated some thirty miles to the east-south-east of Pietersburg, in the Zoutpansberg District.

It is rather an interesting fact that where the Transvaal is pretty fairly worked in the line of *Rhopalocera*, a new species of *Leptoneura* has been discovered. Even more so as this new species is a near ally of, and belongs to, the more southern representatives of this genus.

LEPTONEURA JANSEI, *Swierstra*.

Head: Antennae palpi, thorax and abdomen as in *L. oxylus*.

Wings, Upperside: Dull brown with a slight cupreous gloss, posterior parts of wings slightly paler than basal parts, more so towards apex in forewing; a marginal row of five bluish white unipupilated black ocelli in both wings, except the fifth in hind wing, which is unipupilated.

Forewing: An indistinct stripe at the end of upper half of cell, an exteriorly curved, irregular dentated, pale creamy macular post-median transverse stripe, interiorly edged with dark brown, commencing on costal margin at vein 2, extending downward to vein 1, where the spots become very indistinct. The first spot of this stripe, between vein 8 and 11 elongate with the veins crossing it, scaled with brown. The other spots very irregular triangularly shaped. A curved row of five bluish white unipupilated black ocelli in yellowish ochreous rings of which the first is the smallest, somewhat elongated, placed between veins 6 and 7; the second much elongated, larger than first, between veins 5 and 6; third round, about same size as first, between 4 and 5, the fourth round, largest, between 3 and 4, the fifth smaller than fourth, between 2 and 3. Pupils of first and third ocelli largest. A sub-marginal whitish stripe commencing on vein 8, where it unites with the preceding stripe, extending to tornus. A marginal very pale fulvous stripe from apex to tornus separated from sub-marginal one by a dark brown streak and from cillia by a brown edging.

Hindwing: A post-median curved row of five bluish white pupilated black ocelli in pale fulvous rings of which the fifth is minutely bipupilated. The first ocellus between veins 5 and 6, the second between 4 and 5; the third between 3 and 4; the fourth between 2 and 3, and the fifth between 1c and 2. An additional minute ocellus between veins 6 and 7, much in front of the others. A suffused greyish brown sub-marginal stripe from vein 8 to 1c separated from the darker marginal stripe by a dark brown streak.

Underside: Paler with a very slight gloss; markings more strongly devined.

Forewing: In discoidal cell, about middle, two dark brown spots, one above the other; past middle a S-shaped transverse stria; closing end of upper half of cell another dark stria representing the one on upper side. Spots in cell in rings of greyish white, S-shaped and stria closing upper half of cell exteriorly bounded by greyish white scaling. A transverse exteriorly oblique dark brown stria from cell in a line with spots in cell, to near vein 1. All stria representing those of upperside and row of five ocelli more strongly marked.

Hindwing: Three basal spots surrounded by greyish white scaling, the first two in cell, the third between veins 1c and 2; a sub-median and median irregular exteriorly dentated stria from vein 8 to vein 1c, of which the first is exteriorly and the second interiorly bounded with greyish white; a dark brown stria closing cell. Space between last stria and sub-median one filled with greyish white scaling. Row of five ocelli as on upperside, fulvous rings paler, within another dark brown ring. Instead of one as on upper side, two additional larger ocelli, in dark brown rings of which the second represent the upper one. Row of five ocelli interiorly bounded by whitish violaceous scaling.

This *Leptoneura*, although in many respects relative to *Lep. oxylus*, Trim., can at once be distinguished from that species and from all other known *Leptoneura* by it having a row of five ocelli in forewing, instead of from two to three as in the other species. These five ocelli and those in hindwing are also smaller than the representatives in *Lep. oxylus*, Trim.

I have named this specimen in honour of its capturer, who kindly presented it to the Transvaal Museum.

Length of forewing: 31 mm.

Habitat: One female, Warmberg, near Pietersburg, Zoutpansberg District.

#### LYCAENA JEFFERYI, *Swierstra*.

Head brownish, eyes in pure white rings. Palpi white underneath, blackish above and at tips. Thorax black, covered above with greyish brown and bluish hairs, underneath with greyish white.

Abdomen brown above, greyish white beneath. Legs white.

Wings: Upperside olive brown, with a strong violaceous gloss, with dark brown marginal edgings.

Forewing: With an indistinct narrow streak closing cell. Violaceous covers entire wing.

Hindwing: With a hindmarginal black spot between veins 2 and 3. Cellular mark linear indistinct. Violaceous covers greater part of wing, leaving an apical patch and an innermarginal border of ground colour.

Cilia: Brownish at base, whitish outwardly. No tail.

Underside: Grey with the ordinary marking slightly darker than ground colour, whitish edged.

Forewing: Spot closing cell broader than on upperside, post-median series of chainlike spots as in *skotios*, Druce, with their white edging less distinct. Two sub-marginal rows of very indistinct whitish sagittiform lunules and a linear brownish hindmarginal edging.



Hindwing : Five black, whitish ringed spots before middle, two of which are situated along inner margin, one in cell and the other two along analmargin. Large lunular marking closing cell as in forewing. A postmedian row of six chainlike spots, slightly darker than ground colour, edged with whitish. First spot before second ; second, third and fourth forming an inwardly oblique row ; fifth before fourth and sixth in a straight line underneath the fifth. Two sub-marginal indistinct rows of whitish sagittiform lunules of which the outer row together with a very indistinct marginal row of similar lunules, forms imperfect rings. Black hindmarginal spots exteriorly bounded by greenish metallic scaling, interiorly by a thin indistinct orange line. Besides this spot there is a trace of a similar smaller spot at analangle covered with some greenish metallic scaling.

Cilia greyish at base, whitish outwardly.

This *Lycaena* was discovered by Mr. G. W. Jeffery at Ulundi, near Barberton, after whom I have much pleasure in naming the species. Its nearest ally is *Lycaena* (Catochrysops) *skotios*, Druce, but distinguished on upperside by its violaceous gloss, its whitish cilia and by the underside being greyish instead of olivaceous brown, with the markings and their edging less distinct, the black spots also being smaller than those reproduced in the figure of *Lycaena skotios*. The sagittiform lunules, which are in the same figure of *L. skotios* very distinct are hardly visible in *L. Jefferyi*, and this species also lacks the pale marginal line in both wings which is replaced by a brownish linear edging. The black hindmarginal spot, which is described in *L. skotios*, Druce, as "broadly covered and partially surrounded by rich orange" is in *L. Jefferyi* only a mere indistinct orange edging.

Length of forewing : 19 mm.

Habitat : Ulundi, near Barberton, 21st October, 1906. (Jeffery.)

#### PHASIS DENTATIS, *Swierstra*.

Upperside : Orange yellow, with blackish brown borders.

Forewing : Base lighter than disc, dusted with some blackish scaling.

Black border commencing on costa past middle, widest at apex, abruptly narrowed on vein 4 and then continued evenly along hind margin to vein 1.

Hindwing : Border commencing on costa past middle, forming an equal patch above vein 4, where it narrows and continues as a interiorly deeply dentated hindmarginal streak to analangle, where it becomes a thin edging.

Cilia brownish.

Underside : Hindwing, apical and hindmarginal border of forewing purplish-lake with the usual spots in forewing, and spots and sharply dentated stripes in hindwing.

Forewing : Orange yellow about same colour as on upperside, becoming lighter towards innermargin. Three black, silvery-white centred spots in cell, the one closing cell has got the white centre T-shaped, which might be individual. A post-median row of five black, internally whitish edged spots of which the second is nearest base and so



situated as to form an angle with the first, nearest costa, and third spot; fourth and fifth in a straight line, one underneath the other. A sub-marginal row of seven similar but slightly larger spots with the white edging less distinct. An indistinct marginal row of eight blackish spots externally edged with white dots. A suffused basal and a sub-basal black spot just below cell.

Hindwing: One minute whitish spot at base in cell. A sub-basal curved row of four whitish dark edged spots. A sub-median row of three similar spots of which the middle one closes cell. A curved median whitish, externally dark edged, strongly dentated stripe and the sub-marginal indistinct row of forewing represented by minute elongate white spots between the veins.

Cilia greyish brown, mixed with some whitish between veins.

Allied to *Ph. thyra* (Linn.) but easily distinguished from that species through its smaller hindmarginal border, and the larger apical patch of forewing. In the hindwing the hindmarginal border is represented by a deeply dentated streak, the apical patch is larger and not extending beyond the spot which close cell as is the case in *Ph. thyra*, also sufficiently distinguish *Ph. dentatus* from that species.

Length of forewing:  $15\frac{1}{2}$  mm.

One female from Waterval Onder (Dr. Breyer) in the Transvaal Museum.

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## DESCRIPTIONS OF TWO NEW SPECIES OF FLYCATCHERS FROM PORTUGUESE SOUTH-EAST AFRICA.

BY ALWIN HAAGNER, Assistant in Transvaal Museum.

Amongst a small collection of skins sent me in August, 1908, for verification and identification by Mr. P. A. Sheppard, of Beira, several appeared to be new to science. To make certain of this before describing, they were sent to Dr. Reichenow of the Berlin Museum for comparison, who very kindly acceded to my request, for which I wish to tender him my thanks and due acknowledgment.

From the locality in which Mr. Sheppard resides, a collection of birds has already been made by a trained collector—Mr. C. H. B. Grant of the British Museum—and from which several new species have been described, so it is all the more noteworthy that, in addition, three new species and several new records for South Africa have been discovered by Mr. Sheppard.

I have named the first species after its discoverer, and for the second a new genus seems necessary to which I have also attached the name of its collector, giving to it the specific name of *gunningi*, in honour of Dr. J. W. B. Gunning, Director of the Transvaal Museum, who is now my chief. These birds have since been acquired by the Transvaal Museum.

### BATIS SHEPPARDI, sp. nov.

(A.) Male. Top of the head and nape grey; a broad black band from the bill through the eye, over the cheek, and continued on to the nape; above this, a short, narrow, white line, forming the commencement of an eyebrow. Upperside olive brown, the feathers of the mantle and back with more or less partly hidden white spots; rump much greyer. Upper tail-coverts black; throat and sides of neck snow white, followed by a broad breast-band of orange-brown, which is continued on either side of the body on to the flanks, fading into whitish on the lower portion. Middle of the under-surface from the breast-band to the vent (including under tail-coverts) white. Axillaries and under wing-coverts for the inner half white; those nearest the edge of the wings black, tipped with white. Upper wing-coverts black, the median broadly tipped with white and the inner greater-coverts with the outer web also white. Rectrices tipped with white, the two outer feathers being also edged with white, very narrowly on the inner, broader (about half of the web) on the outer web. Length (of skin), 111 mm.; wing, 60, 75; tail, 35; tarsus, 18.5; bill 12; sex, incert. Locality: Mzimbiti, about twenty-three miles from Beira, Portuguese South-East Africa. 27th May, 1908. (P. A. Sheppard.)

I take this bird to be a male, from the pure white chin and throat, as the females of both *molitor* and *capensis* have a large patch of orange-brown on the throat, from both of which, if a female, it differs in the absence of this patch. In addition, the red flanks distinguish it from *molitor* and the black upper-wing coverts from *capensis*.

(B.) Female. Not quite adult; collected on the 3rd May, 1908, at the same place as the preceding skin. This example has the sides of the face

dark grey, and an eyebrow of buffish-white from the base of the bill, carried on to the temporal region; chin white; throat whitish, strongly washed with orange-brown. Flanks grey. Wings like that of *B. capensis* female. Length, 110; wing, 59; tail, 35; bill, 12.

Professor Reichenow asked me to compare these birds with the description of *B. erythrophthalma* of Swynnerton before describing, with which, however, it cannot be confused, as I have already shown; Swynnerton in his description distinctly stating that his bird resembles *B. capensis*, differing only in size and in the coloration of the iris, while my bird differs considerably from *B. capensis*.

#### SHEPPARDIA, gen. nov.

Resembling *Bradornis* in the narrower bill (6·25 mm. broad at base), tail shorter than the wing and nearly square (only the outer feather on either side hardly a mm. shorter than the others); differing from that genus in that the fourth to sixth primaries are the longest, the second longer than the eighth; rectal bristles well developed, reaching to within 5 mm. of the tip of the bill.

#### SHEPPARDIA GUNNINGI, sp. nov.

Male. Upperside olive-brown, greyer on the head and rustier on the rump and upper tail-coverts. A white eyebrow from the base of the bill behind the nostrils, till beyond the eye. Lores and ear-coverts greyer. Under surface ochreous-orange or pale orange-rufous; the centre of the body from the lower-breast to the under tail-coverts white, the latter slightly tinged with yellowish. Thighs grey. Upper wing-coverts slate-grey, the median shaded and edged with olive. Remiges brown, the first six or seven being edged with grey, and the remainder with rusty olive. Under wing-coverts whitish, tipped with pale yellow, those along the outer edge of the wing grey. Bill dark brown above, and tip of lower mandible; base of lower pale horn. Tail brown, the feathers edged with rusty olive on the outer web. Length, 130; wing, 70·5; tail, 46·75; bill, 13; tarsus, 19. Type in Transvaal Museum. Male; Mzimbiti, near Beira. 5th January, 1908. Collector: P. A. Sheppard.

This bird, which in general coloration resembles the *Callene cyornithopsis* of Sharpe (Bull. B.O.C. XII, 1901 and Ibis, 1902, p. 95, plate 4), and which I at first took for *C. sharpei* or *C. aequatorialis*, differs from these birds in its almost square tail, and in not agreeing with Reichenow's diagnosis of the generic character: "Schnabel seitlich zusammen gedrueckt," whereas this bird has a flatter bill, resembling that of *Bradornis*, but a little more slender. Dr. Reichenow has kindly examined the skin for me, and says that in his opinion it is certainly a "Musicapide." From *cyornithopsis* it differs in having only the centre of the abdomen white, thereby resembling Jackson's *aequatorialis*, but differing from the latter in the colour of the under tail-coverts, which in *aequatorialis* are "orange-rufous" (cf. Bull. B.O.C. CXXI, January, 1906, p. 46). From both of the just mentioned species *gunningi* is further distinguished by its white eyebrow, and from these, as well as *sharpei*, by its grey upper wing-coverts.

## A NEW ELEPHANT SHREW FROM JOHANNESBURG.

By E. C. CHUBB.

### ELEPHANTULUS RUPESTRIS JAMESONI, subsp. nov.

A dark coloured form with untufted tail, differing from *E.r. myurus* in not having white feet.

General colour of upper surface dark reddish-brown, greyish-brown on the sides, and dirty white below; bases of hairs in each case blackish slate. No white ring encircling the eye, or if present only very faintly marked. Ears rufous brown externally covered with white hairs on the inside. Nuchal region scarcely differing in colour from that of the back, slightly more rufous. Upper surface of hands and feet pale brown. Tail about the same length as in *E.r. myurus*, but lighter brown in colour, no brush of long hairs at end.

(I have used for comparison examples of *E.r. myurus* from the Matopos, near Bulawayo, which have been identified by Mr. R. C. Wroughton, and compared with the type in the British Museum.)

Skull similar in every respect to *E.r. myurus*.

*Dimensions* of the co-types (measured in the flesh): Head and body, 125, 125; tail, 135, 145; hindfoot, 34, 35; ear, 23, 26. Skull: basal length, 34, 34.5; greatest length, 38.8, 39.2; greatest breadth, approximately, 21.5, 22.5; interorbital breadth, 7.8, 7.5; breadth of brain case, 16.5, 16.3; front of  $i^1$  to back of last molar ( $m^2$ ), 20.5, 20.8.

Co-types: 2♀ Collected 21st and 29th July, 1906, by Dr. H.

Lyster Jameson, and purchased by the Transvaal Museum.

This sub-species can at once be distinguished from the typical form by its untufted tail and absence of white ring round the eye; while its dull coloured hands and feet prevent its confusion with *E.r. myurus*.

A co-type in the Transvaal Museum.

Bulawayo, 1st November, 1908.

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## A NEW SHREW FROM PONDOLAND.

By E. C. CHUBB, F.Z.S., Acting Curator, Rhodesia Museum.

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While engaged in working out the collection of South African shrews belonging to the Transvaal Museum, I find among them two examples of a very distinct new species of *Myosorex*. In honour of the collector, Mr. H. H. Swinny, it may be known as

### MYOSOREX SWINNYI, n. sp.

A very dark-coloured species with a comparatively large skull. General colour of upper surface very dark brown, almost black; underside a little lighter. Hairs on back about 6 mm. long, dark slate-grey for about four-fifths of their length, followed by a ring of black, and tipped with brown, this latter giving a fine grizzled appearance to the general colour of the back. Upper sides of hands and feet black; claws light-coloured. Tail, above and below, black, with very short hairs and scarcely any tuft at tip. Skull in general characters similar to that in other members of the genus, except that the palate is lengthened anteriorly, with the result that the tooth-row measures more than in any of the other species. Main cusp of  $I^1$  scarcely exceeding  $I^2$  in downward projection.

Dimensions of the co-types (measured in the flesh), two females: Head and body, 74, 81 mm.; tail 45, 48; hindfoot, 15, 13; ear, 11, 9. Skulls: Back of condyle to front face of  $I^1$ , 23.5, 24; basal length, 21, 21.5; greatest breadth across brain-case, 11.2, 11.4; length of upper tooth series, 11.7, 11.7.

Habitat: Port St. John's District, Western Pondoland. Alt. 200 feet.

Co-types: Two females. Collector's numbers: 172, 173.

Collected 21st and 15th April, 1908, respectively, by Mr. H. H. Swinny.

Type is in the Transvaal Museum.

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## THE SOUTH AFRICAN SPECIES OF AGAMA.\*

By LEWIS HENRY GOUGH, Ph.D.

Eight species of *Agama* were quoted by Mr. Selater in his "List of the Reptiles and Batrachians of South Africa" (Ann. S.A. Mus., Vol. I, pp. 95-111, 1899) as occurring in this sub-Continent, viz. :—*Agama hispida* (Linn), *Agama brachyura* Blgr., *Agama aculeata* Merr., *Agama armata* Peters, *Agama atra* Daud, *Agama planiceps* Peters, *Agama microterolepis* Blgr.

The following additions or alterations to the list were then, or have subsequently become, necessary :—

*Agama pulchella* Bocage, 1896, from Modder River, O.R.C.

*Agama holubi* Bocage, 1896, from Modder River, O.R.C.

(*Agama micropholis*, Matschie, 1890, Transvaal).

*Agama distanti*, Blgr., 1902, Transvaal.

However, *Agama micropholis* has been reduced to a synonym of *Agama atra* by Tornier (Zool. Jahrb. Syst. XV, p. 673, 1902), and Boulenger has placed *Agama microterolepis* also in the synonymy of the same species (P.Z.S., 1905, 11 (7), p. 253). *Agama brachyura* has been redescribed by Boulenger (loc. cit., p. 252).

The revised list would now read :—*Agama hispida*, *Agama brachyura*, *Agama aculeata*, *Agama armata*, *Agama atra*, *Agama planiceps*, *Agama atricollis*, *Agama pulchella*, *Agama holubi*, *Agama distanti*.

During the working out of the lizards of the collections of the Transvaal Museum and of the Albany Museum, it became necessary to go into this group more carefully, and it was found that six of the ten species were represented in the collections. As the literature on the subject is rather scattered, and as they form a most difficult group, I am here giving the descriptions of each species, with notes on the specimens at my disposal, and a key for their identification. I have included in the key *Agama kirki*, *Agama mossambica*, *Agama anchietae*, and *Agama colonorum*, as being likely to occur in the northern portion of the sub-Continent, and have also given their descriptions at length.

None of the South African species have a regular gular pouch, but all have a more or less distinct gular fold ; in some species the skin of the throat is somewhat plicate.

The species under consideration can be divided roughly into two groups, species with heterogenous scaling on the back, and species with homogenous scaling. This grouping seems to be faulty when applied to *Agama atra* Daud, some specimens appearing to have almost homogenous scaling, others to have heterogenous. However, closer examination will usually, if not always, reveal the scaling to belong to the latter description. In the key, this species is made to come out under both headings, in order to facilitate identification. The relative length of hind leg to body, i.e. how far it extends when adpressed, as also the relative length of the tail, varies in some species very considerably according to sex ; the tail

\* Paper read at the Grahamstown meeting of the S.A.A.A.S., July, 1908.

and limbs are in proportions shorter in females than in males, thus giving the females a habitus quite different to that of the males. The females usually appear fatter and more flattened. The sexes are otherwise easily recognised by the presence of one or two rows of praeanal pores in the males; the females have no such structures.

### DESCRIPTIONS OF SPECIES.

#### A. DORSAL SCALES EQUAL, NOT INTERMIXED WITH ENLARGED SCALES.

##### 1. AGAMA PLANICEPS. *PETERS*.

Dorsal scales smooth and not mucronate in the adults, roundish, imbricate, moderate sized, not mixed with enlarged scales. (Sometimes more or less strongly keeled, according to Boulenger; also see note by Bocage *Herp. Angola*, p. 19.)

Upper head scales smooth or feebly keeled; occipital enlarged hexagonal or octagonal. (One or two elongate narrow scales on the middle of the snout are mentioned by Bocage, but not shown in his figure; not mentioned by Boulenger.)

Spines short, in groups on the sides of the head near the ear, and on the neck.

Nostrils tubular, directed upwards and backwards on the canthus rostralis. Crests: A slight nuchal, no dorsal, tail keeled above in male.

Scales on the limbs (judging by Bocage's illustration) larger than the dorsals, keeled, not mixed with enlarged spines.

Ventrals much smaller than the dorsals, smooth.

Rows of scales round the body, 64-86.

Fingers: Third and fourth equal.

Toes: Fourth slightly longer than third, fifth extending beyond first.

Colouration: Olive brown above, with small yellow spots, head and tail paler, below uniformly yellow.

Habits: Bocage states that Anchieta found them in cracks and cavities of rocks, usually near human habitations.

Remarks: I have no specimens which I could identify with this species. I have had to combine the description from Boulenger *Cat. Liz* 1, p. 358, and Bocage *Herp. Angola*, p. 18-19. Peters' original description was not accessible. I must, however, point out some discrepancies in the writings of the two authors cited: Boulenger does not remark the elongate narrow scales on the snout, neither does Bocage show them in his figure. Bocage finds the ear-opening as large as the eye-opening, Boulenger records it as much larger than the eye-opening. Bocage states the fourth finger to be a little longer than the third, Boulenger calls them equal.

##### 2. AGAMA COLONORUM. *DAUD*.

Dorsal scales flat, rhomboidal, strongly keeled, mucronate, imbricate, rather large, the keels form straight lines converging towards the median line.

Upper head scales smooth or feebly keeled. Occipital enlarged, surrounded by a few somewhat enlarged scales. An elongate, narrow, keeled scale on the middle of the snout.

Spines on the head: A few very short spines on the sides of the head near the ear and on the neck.

Nostril tubular, directed upwards and backwards, on the canthus rostralis. Crests : A slight nuchal, no dorsal, tail keeled above in the males.

Scales on the limbs, similar to the dorsals.

Ventral scales smooth or feebly keeled, smaller than the dorsals.

Scales around the body, 60-80 (Blgr.)

Fingers : Third and fourth sub-equal, fifth extending beyond first.

Toes : Fourth longest, fifth extending considerably beyond first.

Anal pores in a single row.

Colouration : Dark brown (or olive) above, yellowish grey below ; under side of throat marbled or reticulated with darker.

Remarks : The above description was taken from specimens in the Albany Museum, obtained from Kamerun. *A. colonorum* and *A. planiceps* would seem, judging from Bocage's remarks (loc. cit. p. 19) to merge gradually into each other, and ought perhaps only to be considered as the extreme forms of one species.

### 3. AGAMA KIRKI. BOULENGER.

Dorsal scales strongly keeled, not or very slightly mucronate, imbricate, rhomboidal, small. The keels converge toward the median line.

Upper head scales smooth or feebly keeled, occipital enlarged.

Groups of very small spines on the sides of the head near the ear and on the neck.

Nostril tubular, directed upwards, on the canthus rostralis.

Crests low, but very distinct, nuchal and dorsal, tail keeled above.

Scales on the limbs similar to the dorsals, but larger, not intermixed with enlarged spinose scales. (Judging by the figure, pl. 28, fig. 2, B.M. Cat.)

Ventral scales smooth, scarcely larger than the dorsals.

Scales around the body 99.

Fingers : Fourth longer than third.

Toes : Fourth a little longer than third, fifth extending beyond first.

Tail compressed and keeled above, covered with strongly keeled scales, forming rather distinct annuli.

Anal pores in a single row.

Colouration : Olive above, with dark net work enclosing light ocelli, collarpit black, lower surfaces whitish, with indistinct darker lines.

Remarks : The above description is taken from Boulenger, Cat. Liz., Vol. I., p. 354, no specimen being at my disposal. As the type was obtained by the Zambesi Expedition, it is to be expected that this species may be rediscovered in the northern portion of the sub-Continent.

### 4. AGAMA MOSSAMBICA. PETERS.

Dorsal scales strongly keeled, mucronate, rhomboidal, the keels converging towards the median line.

Head scales more or less strongly keeled, some being pyramidal, occipital enlarged.

Groups of short spinose scales on the sides of the head near ear-opening and on the neck, sometimes wanting on the margin of the ear.

Nostril tubular, directed upwards and backwards, on the canthus rostralis.

Crests : A nuchal, and a dorsal crest, the latter sometimes partially obliterated.

Ventral scales keeled and mucronate (Fischer).



Rows around the middle of the body 77-81.

Fingers : Third and fourth nearly equal.

Toes : Third as long as or slightly shorter than the fourth, fifth extending beyond the first.

Tail slightly compressed, scales strongly keeled.

Colouration : Olive or brown above, with a row of more or less distinct large brown spots on each side of the vertebral line, or a single row of large spots ; lower surfaces lighter, throat dotted blackish.

Remarks : This species may be found to occur in the northern portion of the sub-Continent ; the description has been taken from Boulenger (loc. cit. p. 353) and Fischer (Jahresb. Naturh. Mus. Hamb. f. 1883).

## B. DORSAL SCALES INTERMIXED WITH ENLARGED SPINOSE SCALES.

### 5. AGAMA ATRICOLLIS. SMITH.

#### *Plates XVII and XVIII.*

Dorsal scales small, keeled, mostly mucronate, larger on the median line, intermixed with enlarged, strongly keeled and pointed scales, with a strong tendency to form straight, vertical and transverse lines. A curved fold on each side of the body is marked by slightly enlarged, pointed scales.

Upper head scales smooth or feebly keeled ; occipital not enlarged, usually smaller than the surrounding scales. A few conical scales on the snout.

Spines on the sides of the head small, scattered or in short rows of two or three, chiefly on the cheeks, which are very swollen in adult males, less so in females. The cheeks sometimes almost hide the ear. A few enlarged conical scales usually margin the ear.

Nostril somewhat tubular, pierced just below the canthus rostralis, or just touching it with the upper edge.

Crests : The nuchal crest is marked by a series of enlarged keeled pointed scales, sometimes extending on to the anterior portion of the back.

Scales on the limbs, strongly keeled and mucronate, the keels combining to form regular curved lines, size on the average larger than the dorsals, usually irregular.

Ventral scales smooth.

Tail covered with strongly keeled scales, largest above forming rather regular annuli. In some specimens every three or four rows of scales seen from the side, form an annulus, by reason of the rows increasing in size from 1-3 or 4 ; in these cases one or two rows of scales on the upper surface often correspond to 3 or 4 on the sides.

Fingers : Third and fourth almost equal, fifth extending well beyond first.

Toes : Fourth very slightly longest, fifth considerably longer than first.

Anal pores in two rows.

Colouration in spirits olive or brown above, yellowish beneath, sometimes reticulated with black. The enlarged scales of the back often lighter.

Young specimens often grey with black X shaped markings above, and black annuli on the tail. In life, the adults are very different objects, their colours being much brighter, and capable of being changed at the will of the animal. When excited, the males have bright blue or green heads, backs and ventral surfaces. Females and young do not appear to show the green or blue tints to the same extent.

Habits : I have found this species invariably upon trees ; it seems to take to the ground very unwillingly. When it finds itself observed, it slips over to the far side of the branch or to the other side of the trunk of the tree, much like the European squirrel. Usually a single male and a single female are observed together. When chased or captured, they offer fight very readily. The natives believe them to be poisonous.

Records :

- 1-5 Transvaal.
- 6-8 Waterval Onder, Nov., 1907, Gough (*Plate XVII*).
- 9-10 Lydenburg, Kranz.
- 11 Wonderboom, near Pretoria, Oct., 1906, Noome (figured).
- 12 No records.
- 13 Barberton, March, 1908, Williams.
- 14 No records.
- 15-16 Woodbush, Zoutpansberg District, Dec., 1908, Gough.
- 17-18-19 Kaapmuiden, Sept., 1907, Bolton (*Plate XVIII*).
- 20 Woodbush, Dec., 1907, Gough.
- 21 Wonderboom, Dec., 1906, Noome.
- 22 Louws Creek, Sept., 1907, Gough.
- 23-24-25-26 Waterval Onder, Sept., 1907, Gough.
- 27-28 Barberton District, Jan., 1908.
- 29 Komatipoort, 1906, Ryan.

These records show that the species is found chiefly in central and the eastern Transvaal in the low and middle veld.

## 6. AGAMA ANCHIETAI. *BOCAGE*.

Dorsal scales keeled and mucronate, the median rows largest, disposed in longitudinal rows. The scales of the sides of the back intermixed with groups of, or single, enlarged more strongly mucronate scales, not forming longitudinal series.

Head scales mostly keeled, occipital enlarged.

Groups of short spines on the sides of the head and neck, no spines on either anterior or inferior margin of the ear.

Nostril tubular (situated ?).

Crests : A distinct nuchal crest, the dorsal crest replaced by the keels of the median row.

Ventrals smaller than the dorsals, more or less keeled.

Fingers : Third slightly longer than the fourth.

Toes : Third slightly longer than the fourth, fifth extending as far as the first.

Tail twice as long as the body, caudal scales larger than the dorsals, keeled and mucronate.

Colouration variable, uniform pale olive brown or more or less bright yellow, with transverse black bands, interrupted in the median line by a spot of the ground colour.

Remarks : The description of this species, which has not yet been found in South Africa is taken from Bocage *Jorn de Sci., Math., 1896, No. XV, p. 129.*

7. AGAMA BRACHYURA. *BOULENGER.**Plate XIX, figs. 1, 2.*

Dorsal scales irregular, strongly imbricate, keeled, intermixed with strongly enlarged, keeled, mucronate spinose scales, with a tendency to form regular longitudinal rows.

Head scales more or less keeled, on the middle of the snout enlarged, trihedral; some trihedral scales around the enlarged occipital scale on the upper surface of the head are more or less spinose.

Groups of spinose scales on the sides of the head, around ear, and on the neck.

Nostril not tubular, pierced just below the canthus rostralis.

Crests distinct on neck and on body (sometimes wanting on body [Blgr.]).

Ventrals smooth or very feebly keeled.

Fingers: Third longest, fifth extending beyond first.

Toes: Third and fourth sub-equal, fifth not extending as far as the first.

Tail covered with strongly imbricate, keeled scales, larger than the dorsals; some enlarged scales at the base.

Limbs covered with unequal, strongly keeled scales, mostly larger than the dorsals.

Anal pores in one row.

Colouration: Dark brown above, with a row of black spots on each side of the vertebral line, tail annulate, under surfaces grey, with very wide blackish reticulations.

Records: One male, locality (?); Taylor (*Plate XIX, figs. 1, 2*).

8. AGAMA HISPIDA. (*LINN.*)*Plate XX, figs. 3, 4.*

Dorsal scales moderate, strongly keeled and mucronate, intermixed with strongly enlarged spinose scales, forming more or less regular longitudinal rows.

Head scales rough, keeled, or sub-conical; occipital enlarged, nearly surrounded by conical spinose scales. A few enlarged sub-conical scales on the middle of the snout.

Spines on upper surface of the back of the head and on the sides of the head near the ear in groups, also on the neck.

Nostril not tubular, lateral, just below the canthus rostralis, very close to hind margin of nasal.

Crests on the neck and back very distinct.

Ventral scales strongly keeled and mucronate.

Scales on limbs like the dorsals, strongly keeled and intermixed with enlarged ones.

Fingers: Third longest, first extending as far as the fifth.

Toes: Third longest, fifth extending well beyond first.

Anal pores in a single row.

Tail with scattered enlarged spinose scales at the base.

Colouration: Brown or olive, spotted with darker, lighter beneath; vertebral stripe absent.

Records:

1-2 Cape Colony, Godeffrey (*Plate XX, figs. 1, 2, 3*).

3-4 Stellenbosch, Dr. Breyer.

5-6 Lydenburg, Kranz.



*Plate XVII.*

***Agama atricollis***, Smith, male.





*Plate XVIII.*

**Agama atricollis**, Smith, female.



Plate XIX.

**Agama aculeata**, Merr.

1. Dorsal ; 2. Ventral.

**Agama brachyura**, Boulenger.

1. Dorsal ; 2. Ventral.

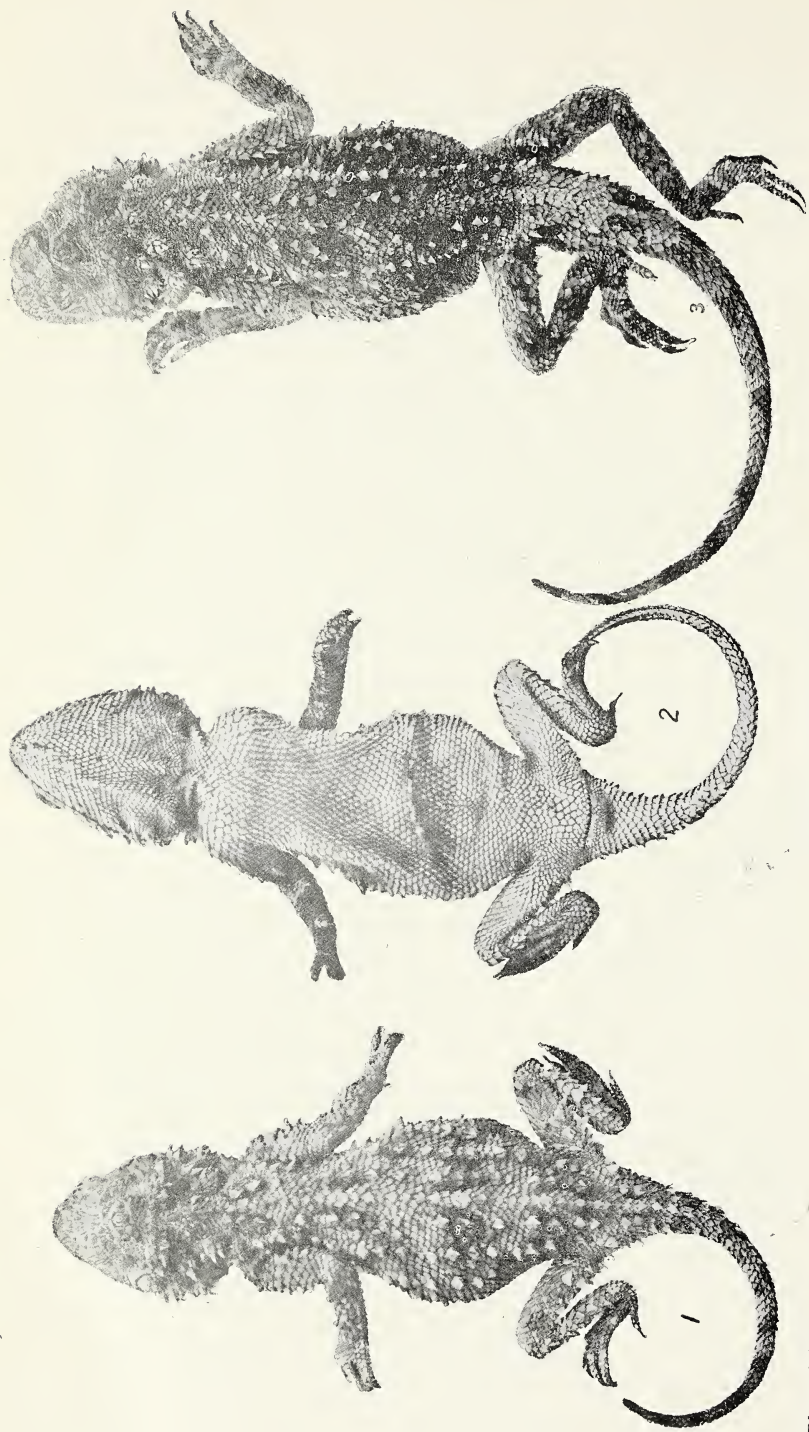


Plate XX.

**Agama hispida** (Linn.)

1. Female, dorsal ; 2. Female, ventral ; 3. Male.



7-8 Waterval Onder, Nov., 1907, Gough.

9 No record. Intermediate in characters between this species and *A. hispida* var. *distanti*. Vertebral line reduced to a few spots, ventrals strongly keeled.

AGAMA HISPIDA VAR. DISTANTI. BOULENGER.

Plate XXI, figs. 1, 2, 3.

Dorsal scales (smaller than in the preceding species, compare photographs), strongly keeled, imbricate, mucronate, intermixed with strongly enlarged spinose scales, arranged in longitudinal rows.

Head scales rough, keeled. Occipital enlarged, some sub-conical scales on the middle of the snout and on the back of the head, perhaps not quite so raised as in *A. hispida*.

Spines on the sides of the head near the ear and on the neck in small groups. On the upper surface of the head the spines are short, sub-conical, perhaps not quite so large as those of *A. hispida*.

Nostril, not tubular, just below the canthus rostralis.

Crests : A very distinct nuchal and dorsal crest.

Ventrals smooth or feebly keeled (sometimes strongly keeled !).

Scales on the limbs strongly keeled, larger than the dorsals, unequal.

Fingers : Fourth longest, first and fifth equally long.

Toes : Third longest, fifth not extending as far as the first.

Tail with strongly keeled mucronate scales, intermixed with enlarged spinose scales at the base.

Colouration very variable, a light, sometimes broken, vertebral stripe constantly present, dark brown or reddish brown above, spotted or barred with darker. A V-shaped light mark often present across the head above the eyes, another light bar across the snout just in front of the eyes, sides of belly and chest often brick red, belly yellowish. Throat usually with blue or black markings forming reticulations or longitudinal wavy lines.

Habits : *Agama hispida* var. *distanti*, Blgr., is very common in most parts of the Transvaal ; it frequents stony places, and may often be found along the sides of a road. When running it carries its belly well off the ground, and its tail in the air. It usually runs a short distance, then squats down suddenly, moving on again if disturbed. One frequently sees them raising and lowering their heads and the front part of the body rapidly for several times in succession. They often sit at the opening of an ant's nest and pick off each ant as it comes out. The female digs a hole two or three inches deep to lay its eggs in, and fills in the hole again, having deposited its eggs. I have also observed them climbing up shrubs to a height of a yard or more above the ground (especially near Woodbush). It is interesting to note that about 80 per cent. of the specimens found around Pretoria are infested with Cestodes.

Records :

1-20 Pretoria, 1907.

21 Transvaal.

22-23-24 Waterberg, May, 1899.

25 Pretoria, Sept., 1897, Gunning.

26-30 Pretoria, Aug., 1897.

31 Pretoria, 1906, Kirby.



- 32 Irene, Taylor.  
 35-36 Transvaal.  
 37. Pretoria (*Plate XXI*, figs. 1, 2).  
 38 Woodbush, 1907, Gough (*Plate XXI*, fig. 3).  
 39 Lydenburg, Kranz.  
 40 Brandfort, Orange River Colony, 1907, Haagner.  
 41 Pretoria, Breyer.  
 42 Pretoria, 1897, Durr.  
 43-45 Krabbefontein, Breyer.  
 46-47 Transvaal, Visée.  
 48 Pretoria, 1897.  
 49 Selati, Flygare.  
 50 Waterval Onder, 1907, Gough.  
 51 Woodbush, 1907, Gough.  
 52 Transvaal.

Remarks: *Agama distanti*, Blgr., was described in 1902 by Boulenger to include the small *Agama* which occurs in abundance about Pretoria, the chief, and most easily observed, differences from *A. hispida* being in colouration. Boulenger, however, points out that they differ from *A. hispida* also in structural characters, notably in the larger size of the ear-opening, and in the absence, or feeble development, of keels on the ventral scales of the Transvaal *Agama*. In calling *Agama distanti*, Blgr., a variety of *A. hispida*, I am led by the following considerations:—The ventral stripe is usually very distinct, but in the large number which has passed through my hands, of which only a small part have been recorded above, many specimens show the vertebral stripe broken up into spots, and sometimes only just indicated. The keels on the ventrals are as stated by Boulenger, very often wanting or weak; some specimens, however, agree perfectly in this respect with *A. hispida*. As to the relative size of the ear-opening, I have not been able to notice any difference in this respect between the specimens of the two species. Boulenger only remarks the larger size of the ear-opening in *A. distanti* than in *A. hispida*. For the latter species he states: Ear-opening small, not quite as large as the ear-opening. Summing it all up, while admitting a difference to exist, I find that it is chiefly a difference in colouration, and usually, but not always in the degree of development of the keels of the ventral scales. Under these circumstances I prefer to consider *A. distanti* only as a geographical variety of *A. hispida*.

#### 10. AGAMA ARMATA. PETERS.

Dorsal scales moderately large, imbricate, strongly keeled, intermixed with enlarged scales, forming three or four longitudinal series.  
 Upper head scales keeled, back of head with scattered short spines, occipital enlarged.  
 Groups of strong spines on the sides of the head and neck.  
 Nostrils tubular, lateral, pierced just below the canthus rostralis.  
 Crests distinct on neck and back.  
 Ventral scales strongly keeled and mucronate.  
 Fingers: Third slightly longer than fourth.  
 Toes: Third slightly longer than fourth, fifth extending beyond the first.  
 Tail: Rounded, covered with strongly keeled scales.

Colouration : Olive brown above, the enlarged scales lighter, a double series of dark spots along the back ; lower surface lighter, the throat with darker longitudinal lines.

Remarks : The description is taken from Boulenger. Bocage (loc. cit., p. 128) remarks on some specimens which he refers with some reserve to this species. In these the ventral keels are more or less effaced, the fifth toe just extends beyond the first, and the first rows of enlarged scales are symmetrically arranged in curves. Bocage's specimens had only one row of anal pores, as compared to two in the type. Peters' description is inaccessible to me.

### 11. AGAMA PULCHELLA. *BOCAGE*.

Dorsal scales small, hexagonal, strongly carinated and mucronate, intermixed with enlarged scales arranged in longitudinal rows on the vertebral region, or scattered, isolated, or in small groups. A dorso-lateral fold gives insertion on each side to a row of spines.

Head scales partly smooth, partly tubercular, occipital enlarged.

Groups of prismatic scales on the sides of the head and neck, a few spines around the margin of the ear.

Nostril on the canthus rostralis.

Crests on the neck, back and on the anterior two-thirds of the tail distinct.

Ventral scales smaller than the dorsals, their keels more or less effaced.

Fingers : Fourth slightly longer than third.

Toes : Fourth longer than third, the fourth extends far beyond the first.

Scales around the body 130-140.

Scales on tail and upper surface of the limbs much larger than the dorsals.

Praeanal pores in a single row.

Colouration : Ground colour grey brown with irregular blackish markings, a light vertebral stripe extending on to the tail, some small grey spots on the back, under surfaces grey, with greyish black or greyish blue wide reticulations. The vertebral band is absent in the young.

Remarks : The types were collected at Modder River by Dr. Holub. The description is taken from Bocage (loc. cit., pp. 116-117). I have not yet found this species.

### 12. AGAMA ACULEATA. *MERR.*

*Plate XIX, figs. 1 and 2.*

Dorsal scales strongly imbricate, keeled often mucronate intermixed with strongly enlarged ones.

Upper head scales smooth or feebly keeled.

Groups of small spines on the sides of the back of the head, and on the neck.

Nostril tubular, on the canthus rostralis.

Crests distinct on neck and back.

Ventrals imbricate, smooth.

Fingers : Third longest, fifth extending beyond the first.

Toes : Third longest, fifth extending as far as the first.

Tail rounded, caudal scales larger than dorsals.

Scales on upper surface of the limbs unequal. A single row of anal pores.

Colouration : Olive brown above with a double series of large dark spots. (A light vertebral stripe extending on to the tail sometimes present.)

Under surface grey, throat with dark blue reticulations.

Records : I, Bandalier Kop, Zoutpansberg, 1906, Gough (*Plate XIX*, figs. 3, 4).

### 13. AGAMA ATRA. DAUD.

*Plates XXII, XXIII, XXIV.*

Dorsal scales imbricate, strongly keeled and mucronate, largest on vertebral line, intermixed with scattered, somewhat enlarged, scales.

Head covered with smooth, sometimes convex, scales.

Groups of short spines on the sides of the head, near the ear, and on the neck.

Nostrils tubular, directed upwards and backwards, on the canthus rostralis.

Crest distinct on neck (and on the tail in adult males).

Ventrals smooth, imbricate.

Rows around body 120-180.

Fingers : Fourth slightly longest, fifth projecting beyond first.

Toes : Third and fourth sub-equal, or fourth slightly longest, fifth extending well beyond first.

Tail rounded in young and in female, strongly compressed in male, caudal scales much larger than dorsals, strongly keeled and mucronate.

Anal pores in a single row.

Scales on the upper surface of the limbs larger than the dorsals.

Colouration very variable. In my specimens a light vertebral stripe is usually present. Adults from Woodbush are grey above, marbled with darker, sometimes with a row of large dark blotches on each side of the vertebral line, edges of belly brick red, under surfaces grey, diffused with blue, under surface of throat reticulated with blue. Other specimens are dark olive brown above, with a yellow vertebral stripe and a few small yellow spots above, under surfaces yellow, throat and chest bluish, young often brown, widely reticulated with orange, grey beneath.

Remarks : *Agama atra* is a species with a very wide range of variation, as is proved by the creation of the synonymic species *A. micropholis* and *A. microterolepis* by Matschie and Boulenger. The specimens at my disposal can be divided into several groups according to colouration.

Records :

A. Light greyish specimens (as described from Woodbush).

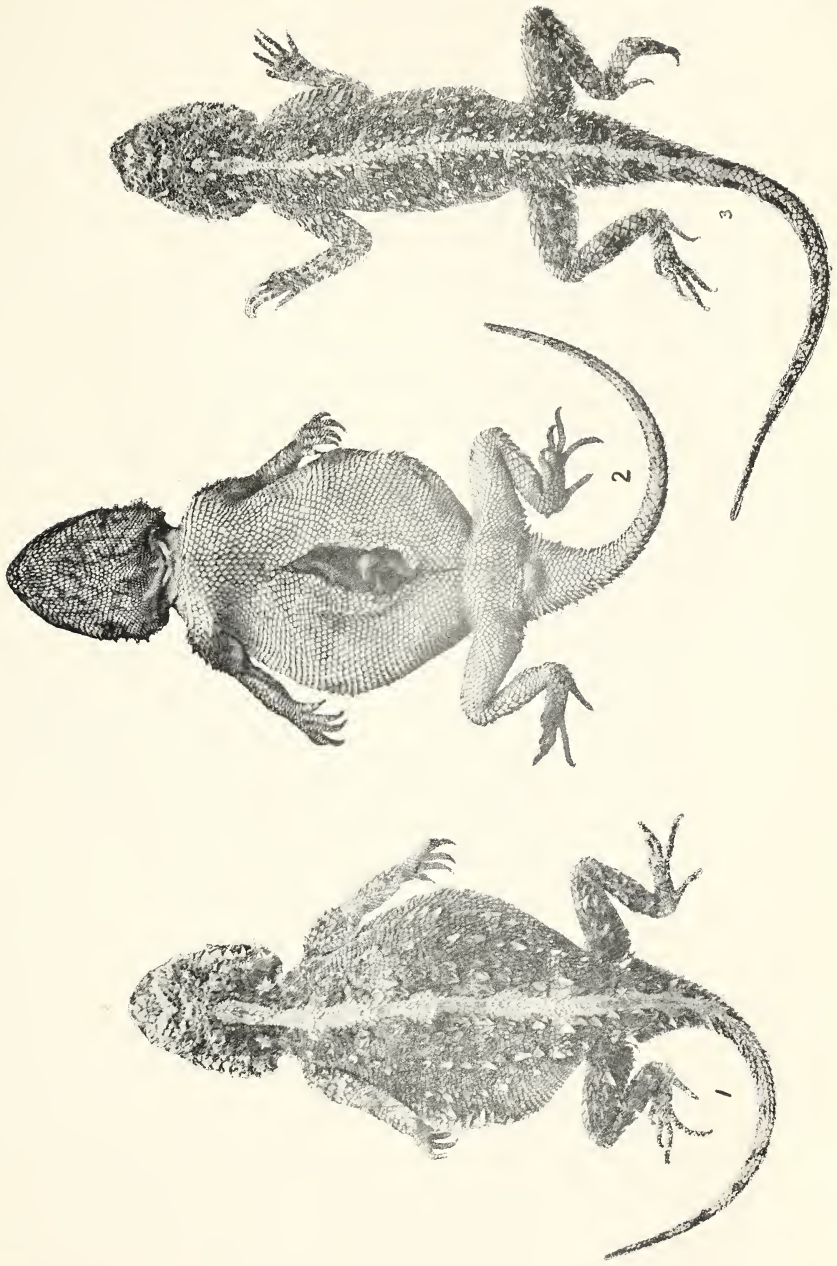
1-4 (Adults) Woodbush, Zoutpansberg XII, 1907, Gough (*Plate XXII*).

5 (Half-grown male, tail not compressed), Heidelberg, Tvl., XII, 1906, Howard (*Plate XXIV*, fig. 3).

B. Dark brown specimens, with orange vertebral stripe and small orange spots, under surfaces bluish anteriorly, dirty yellow posteriorly.

6 (Adult male) Transvaal, 1906, Coll. Ross.

7 (Adult male) Hanover, C.C., Taylor (tail strongly compressed).



**Agama hispida, var. cf. instanti**, Boulenger.  
1. Female, dorsal ; 2. Female, ventral ; 3. Male.





*Plate XXII.*

**Agama atra**, Daud., male.



*Plate XXIII.*

**Agama atra**, Dand., female.





*C.* Brown, with wide orange reticulations and small white spots above, lighter beneath (brownish or whitish), sometimes reticulated with bluish on throat.

8-10 (Young) Dedeur, Evaton, 1907, Kolkenbek (*Plate XXIV*, fig. 2).

11-12 (Adult females) Frederikstad, 1907, J. J. Cable (*Plate XXIII*).

13-15 (Young), no locality, 1906, Coll. Ross.

16 Half-grown, Dedeur, Evaton, Oct., 1907, Kolkenbek.

*D.* as *C.*, but without reticulations, some lighter markings.

17-19 (Young) Grahamstown.

19-21 (Adult male and half-grown females) Hannover, C.C., Taylor.

*E.* Blackish above and below, tail brown above, yellow below.

22 Adult male, Hannover, C.C., Taylor.

*F.* (Female) differs considerably in habitus from all other specimens. Scales on back of head mostly keeled, some conical. Enlarged scales on back much larger than normal. Scales on limbs very unequal. Spines on side of head larger than usual, ear-opening small. Ventral scales very weakly keeled. Above brown, a light vertebral stripe, enlarged scales lighter, below yellowish, throat and chest reticulated with blue.

23 Adult female, Transvaal (*Plate XXIV*, fig. 1).

Note.—Some specimens I kept alive could change their colours to bright blue in a manner similar to *A. atricollis*.

#### 14. AGAMA HOLUBI. *BOCAGE*.

Dorsal scales, smooth or feebly keeled, surmounted by a small spine, intermixed with scattered enlarged spinose scales.

Head covered by smooth, flat scales, and conical pointed scales, occipital enlarged.

Groups of short spines around the margin of the ear, on the sides of the head, and on the neck.

Nostril, on the canthus rostralis.

Crests, only on the neck.

Ventrals, smooth quadrangular, sub-equal in size to the dorsals.

Rows around the body, 170-180.

Fingers: Third slightly shorter than fourth.

Toes: Third and fourth sub-equal, fifth extending beyond the very short first.

Tail longer than head and body, caudal scales much larger than the dorsals, strongly keeled and mucronate.

Limbs covered with strongly keeled, mucronate scales, larger than the dorsals.

Colouration: Grey above with small irregular brown spots and white dots.

Tail and limbs with equally spaced brown transverse markings.

Remarks: The description is taken from Bocage (loc. cit., p. 116). The type specimen was collected by Dr. Holub at Modder River (O.R.C.) Evidently very closely related to *A. alra*, if not identical.



## A G A M A.

## KEY TO THE SPECIES OCCURRING IN SOUTH AFRICA.

- 
- |  |     |     |     |     |    |   |
|--|-----|-----|-----|-----|----|---|
| 1. Dorsal scales equal   | ... | ... | ... | ... | 2  |   |
| Dorsal scales unequal, i.e. mixed with scattered enlarged scales   | ... | ... | ... | ... | 6  |   |
| 2. No dorsal crest   | ... | ... | ... | ... | 3  |   |
| A dorsal crest   | ... | ... | ... | ... | 5  |   |
| 3. Dorsal scales smooth, not mucronate   | ... | ... | ... | ... |    | <i>Agama planiceps</i> (p. 184).              |
| Dorsal scales keeled   | ... | ... | ... | ... | 4  |   |
| 4. 120-160 scales around the middle of the body  | ... | ... | ... | ... |    | <i>Agama atra</i> (p. 192).                   |
| 60-80 scales around the middle of the body, an enlarged scale on the snout   | ... | ... | ... | ... |    | <i>Agama colonorum</i> (p. 184).              |
| 5. Ventrals smooth   | ... | ... | ... | ... |    | <i>Agama kirki</i> (p. 185).                  |
| Ventrals keeled  | ... | ... | ... | ... |    | <i>Agama mossambica</i> (p. 185).             |
| 6. Occipital enlarged, or males with a single row of preanal pores...  | ... | ... | ... | ... | 7  |   |
| Occipital not enlarged, males with a double row of preanal pores...  | ... | ... | ... | ... |    | <i>Agama atricollis</i> (p. 186).             |
| 7. Fifth toe not extending as far as the first   | ... | ... | ... | ... | 8  |   |
| Fifth toe extending as far as or beyond the first  | ... | ... | ... | ... | 11 |   |
| 8. No spines on the anterior or inferior border of the ear   | ... | ... | ... | ... |    | <i>Agama anchietai</i> (p. 187).              |
| Spines on the anterior and inferior border of the ear  | ... | ... | ... | ... | 9  |   |
| 9. Third and fourth toes sub-equal   | ... | ... | ... | ... |    | <i>Agama brachyura</i> (p. 188).              |
| Third toe distinctly longest   | ... | ... | ... | ... | 10 |   |
| 10. No vertebral stripe, ventrals strongly keeled  | ... | ... | ... | ... |    | <i>Agama hispida</i> (p. 188).                |
| A vertebral stripe, ventrals usually weakly keeled or smooth   | ... | ... | ... | ... |    | <i>Agama hispida, var. distanti</i> (p. 189). |
| 11. Ventral scales keeled  | ... | ... | ... | ... | 12 |   |
| Ventral scales smooth  | ... | ... | ... | ... | 13 |   |
| 12. Nostril pierced just below the canthus rostralis, back of head with scattered short spines, ventrals strongly keeled and mucronate | ... | ... | ... | ... |    | <i>Agama armata</i> (p. 190).                 |
| Nostril pierced on the canthus rostralis, back of head with groups of prismatic enlarged spines, ventral keels more or less effaced    | ... | ... | ... | ... |    | <i>Agama pulchella</i> (p. 191).              |
| 13. A feeble but distinct dorsal and nuchal crest  | ... | ... | ... | ... |    | <i>Agama aculeata</i> (p. 191).               |
| No dorsal crest (nuchal crest present)   | ... | ... | ... | ... | 14 |   |
| 14. Upper head scales smooth or feebly keeled  | ... | ... | ... | ... |    | <i>Agama atra</i> (p. 192).                   |
| Upper head scales smooth and flat, intermixed with pointed conical scales  | ... | ... | ... | ... |    | <i>Agama holubi</i> (p. 193).                 |

## ON A SUB-FOSSIL HARE FROM A CAVE DEPOSIT AT GODWAN RIVER.

BY DR. LYSTER JAMESON.

In a small collection of animal remains brought from Godwan River, on the Delagoa-Pretoria line, by the late Dr. Karl Wildner of Johannesburg, was the skull of a hare of the genus *Pronolagus*, which seems to occupy a position intermediate between the two living representatives of the genus *P. crassicaudatus* (Is. Geoff.) and *P. ruddi* (Thomas and Schwann), Abstr. P.Z.S. No. 18, p. 23, April, 1905, and P.Z.S., 1905, Vol. I, p. 272, pl. XVI, and which I propose to call *Ronolagus intermedius*, n. sp.

The skull was found in a thin bed of red earth, cemented together into a solid matrix by carbonate of lime, in a lime deposit in the face of a hill which was being worked for commercial lime. I have not yet had an opportunity of examining the spot; but, from Dr. Wildner's description, the deposit is probably the remains of a cavern in the Dolomite, which has become secondarily obliterated by stalagmitic deposits.

Such deposits of stalagmite are being worked for lime in many parts of the Transvaal where the Dolomite formation occurs. Beds of red earth, representing former floors of the caves, are common in these deposits, and in several places (e.g. Wonderfontein, near Bank Station, and Sterkfontein, near Krugersdorp) contain bone braccias that ought to be systematically studied before all these deposits have been passed through the kilns.

The type specimen of this hare consists of a fairly perfect skull and lower jaw.

*Description*: Skull intermediate in size between *P. crassicaudatus* and *P. ruddi*; heavily built. Muzzle broad proximally, relatively and absolutely broader than even in *P. ruddi*.

The frontal bones are lost, but from the contour of the maxillæ and premaxillæ it would appear that the frontal profile was probably more convex than in *P. ruddi*.

Postorbital wings resemble those of *P. ruddi*, but the angle between them and the brain case is narrower.

Anterior shoulder of the zygoma not produced forward as in *P. ruddi*, but not so acute, and with a more obtuse angle between itself and the nose.

The palatal foramina resemble those of *P. crassicaudatus*, but are broader in the middle, and slightly constricted posteriorly by their inwardly directed edges.

Bullæ very large, as in *P. crassicaudatus*.

Incisors deeply grooved. Upper molars resemble those of *P. ruddi*, in that the uncrenulated parts of the anterior enamel walls of the posterior laminae extend about half way across the tooth, and further in having the crenulated outer parts of the posterior enamel walls of the anterior laminae and of the anterior enamel walls of the posterior laminae about equally developed.

The anterior wall of the anterior lower premolar is only faintly crenulated. The lower molars are not well preserved.

Dimensions : Compared with those of *P. ruddi* (Thomas, *loc. cit.*) and *P. crassicaudatus curryi* [Thomas, Ann. Mag. Nat. Hist. (7), Vol. X, 1902, pp. 244-6] :—

<i>Skull.</i>	<i>Pronolagus intermedius.</i>	<i>P. crassicaudatus curryi.</i>	<i>P. ruddi.</i>
Basilar length .. ..	*70 mm.	63 mm.	72 mm.
Zygomatic breadth.. ..	42 mm.	39 mm.	40 mm.
Interorbital breadth ..	(about) 18 mm.	13·2 mm.	16 mm.
Intertemporal breadth ..	„ 14 mm.	11·8 mm.	13·3 mm.
Diastema .. ..	30 mm.	26·5 mm.	30 mm.
Palatal foramina .. ..	28 9·5 mm.	25 7·5 mm.	26 8·5 mm.
Palatal bridge .. ..	10 mm.	7 mm.	9·7 mm.
Breadth of muzzle at base	24 mm.	†19 mm.	†23 mm.

The posterior nares are narrow, as in other members of the genus (6 mm.), and the contours of the lower jaw also conform to the *pronolagus* type.

This skull then belongs to a hare, which, in its cranial characters, was more heavily built than either *P. ruddi* or *P. crassicaudatus*. It agreed with the former species in its broad arch nose and in the relations of the postorbital processes, the anterior shoulder of the zygoma-root, and the upper molars.

On the other hand the palatal foramina, the incisors, and the large bullæ are characters which it shares with *P. crassicaudatus*.

Transvaal University College,  
September, 1907.

\* As the basioccipitæ could not be seen the skull was measured from the paroccipital process forward.

† Measured from Thomas' figures.

DESCRIPTION OF A NEW WARBLER OF THE GENUS *CISTICOLA*.

BY ALWIN HAAGNER, Assistant, Transvaal Museum.

Amongst the small collection of birds sent by Mr. P. A. Sheppard, from the neighbourhood of Beira, and mentioned in my previous paper in this number of the "Annals," was a little warbler which appeared to be undescribed. In revising the Museum collection of warblers I came across another specimen from Matabeleland, which appears to be identical with the Beira bird, except that it is a little larger. I have since also found another example in the recently acquired collection of Messrs. Kirby and Roberts, from the Boror District, just north of the Zambezie River, Portuguese South-East Africa.

*CISTICOLA CINNAMOMEICEPS*, sp. nov.

Similar to *fulvicapilla*, but differing in that the underparts are whitish, only the sides of the breast and body and flanks being greyish, the flanks and chest washed with yellowish; cheeks pale tawny, and not dusky-grey, as in *fulvicapilla*.

*Description*: Above drabish-brown, with a wash of tawny. Top of head and nape pale chestnut-brown or "cinnamon-rufous." Under surface whitish with here and there a yellowish tinge. Sides of the breast and flanks grey, washed with very pale tawny-yellow. Under tail-coverts dirty white. Thighs pale fulvous. Tail coloured like the back, with the ends of the feathers paler, and a faint indication of a subterminal dusky bar. Lores, eyebrow, and cheeks pale tawny-yellow, the latter streaked with dusky. Remiges brown, edged with pale fulvous on the outer web, the edging of the outermost primaries being nearly white. Inner web margined with pale rufous. Bill: Upper mandible pale horn-brown; lower pale yellowish.

(a) Male. Matabeleland, 16th September, 1905. (C. Wilde.)  
Length, 108; wing, 52; tail, 42.75; tarsus, 18.5; bill, 11 mm.

(b) Sex uncertain. M'Zimbiti, near Beira, 12th January, 1908. (P. A. Sheppard.) Length, 100; wing, 50; tail, 39; tarsus, 18; bill, 11 mm.







Bale & Danielsson, L<sup>td</sup> map.

ANTHREPTES REICHENOWI, GUNNING, ♂ & ♀ AND  
CISTICOLA CINNAMOMEICEPS, HAAGNER.





Bale & Danielsson, L<sup>ds</sup> imp

BATIS SHEPPARDI HAAGN. ♂ & ♀ & SHEPPARDIA GUNNINGI, HAAGNER.







Bale & Danielsson, L<sup>td</sup> imp.

COSSYPHA HAAGNERI, GUNNING & HEMIPTERYX MINUTA, GUNNING.





ANNALS

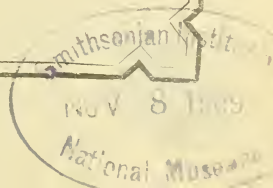
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UNTERSUCHUNG VON BUSCHMANN-SCHÄDELN UND  
SKELETTEN AUS DEM TRANSVAAL-MUSEUM.

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Von Dr. RUDOLF PÖCH, aus Wien.

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(Tafel XXV bis XXXIII.)

Im Transvaal-Museum in Pretoria befinden sich zwei Skelette, die aus Knysna an der Südküste der Kapkolonie als Buschmann-Skelette eingebracht wurden (*Anthr. Cat.* 1 und 2), und ein Schädel aus dem ältesten Bestande des Museums, ohne Angabe der Herkunft, mit der Bezeichnung Buschmannschädel (*Anthr. Cat.* 3). Dieses osteologische Material wurde durchgesehen, gemessen und photographirt und dabei dessen Zugehörigkeit zur Buschmannrasse festgestellt.<sup>1</sup> Die Ergebnisse dieser Untersuchungen werden im Folgenden veröffentlicht, da die Buschmannrasse unter den anderen Menschenrassen eine Sonderstellung einnimmt, und von ihr verhältnismässig nicht viel Material erhalten ist.

Die Beschreibung ist nach den Körpertheilen geordnet, die Theile von *Anthr. Cat.* 2 sind immer vorangestellt, weil sie mehr charakteristische Eigenthümlichkeiten zeigen. Die Schädel sind nach der Frankfurter Horizontalebene orientirt, alle Masse sind mit Mess-Instrumenten nach Professor R. Martin genommen und in Millimetern angegeben. Die photographischen Aufnahmen wurden alle bei möglichst gleicher Entfernung der Einstellebene vom Objektiv gemacht, so dass die Abbildungen alle in demselben Grössenverhältnis zu den Objekten stehen. Verwendet wurde ein Zeiss-Anastigmat von 285 mm. Brennweite und einer Lichtstärke von 1 : 12·5, die Einstellebene war 125 cm. vom Objektiv entfernt.

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<sup>1</sup> Auf die Unterschiede zwischen Buschmann, Masarwa, Nama, Strandlooper, u.s.w. wird in dieser Arbeit nicht eingegangen.

## SCHÄDEL.

*Anthr. Cat. 2* (Tafel XXV u. XXVI).

## HIRNSCHÄDEL.

Der Schädel ist von der Norma verticalis aus gesehen, ovoid, die Tubera parietalia laden seitlich aus, die Tubera frontalia verdecken von hier aus gesehen die Arcus superciliares, die Jochbogen verschwinden fast ganz unter dem Schädeldach, der Schädel ist also fast kryptozyg. Der Alveolarfortsatz des Oberkiefers ist bei vollständig perpendikulärer Aufsicht über dem Stirnrand gerade noch sichtbar.<sup>1</sup> In der Norma lateralis fällt die besonders steile Stellung der Stirne auf. Die Entfernung des vorspringendsten Theiles der Stirne vom äussersten Punkte des Hinterhauptes ist grösser als die der Glabella von dieser Stelle. Da alle drei Schädel diese Eigenthümlichkeit zeigen, seien gleich hier die entsprechenden Masse aller mitgetheilt:

Anthr. Cat. 2.	Anthr. Cat. 1.	Anthr. Cat. 3.	
180	184	170	Entfernung d. Glabella vom äussersten Theile d. Occiput.
184	188	171	Entfernung des vorspringendsten Punktes der Stirne vom äussersten Theile d. Occiput.

Im Verhältnisse zum relativ breiten Stirnschädel erscheint der Schädel in der Gegend der Schläfegruben besonders schmal, die Breite zwischen den Pterien ist kleiner als die zwischen den Stephanien. Diese Umkehrung der als Norm geltenden Verhältnisse nennt man Stenokrotophie:—

	Pterien- breite.	Stephanien- breite.	Stenokro- tophie. Pterienbr. < Stephanbr. um :	Keine Stenokrot. Pterienbr. > Stephanbr. um :
Anthr. Cat. 2. Buschmann ..	109	112	3	—
Anthr. Cat. 1. Buschmann ..	115	115	0	—
Anthr. Cat. 3. Buschmann ..	97	99	2	—
Anthr. Cat. 4. Kaffer ..	110	105	—	5
Anthr. Cat. 5. Kaffer ..	115	115	0	—
Anthr. Cat. 7. Kaffer ..	108	107	—	1
Anthr. Cat. 8. Kaffer ..	103	106	3	—
Anthr. Cat. 6. Europäer ..	133	125	—	8

<sup>1</sup> Dieses Verhältniß kann nur durch vollständig planparallele Projection (z. B. mit Hilfe eines Zeichentisches) zur Darstellung gebracht werden, nicht durch die Photographie.

Der vorstehende Vergleich der Buschmannschädel mit einigen Neger-  
schädeln spricht dafür, dass die Stenokrotaphie der Buschmannschädel  
weniger den Ausdruck einer besonderen Enge der Pterienbreite, als einer  
relativen Breite in der Stephaniengegend ist.

Links besteht eine *Articulatio pterygoparietalis*, die Knochennaht ist  
15 mm. lang, rechts ist zwischen *Os frontale*, *sphenoideum*, *temporale* und  
*parietale* ein *Os ptericum* eingeschaltet, dass 40 mm. breit und 8 mm.  
hoch ist.

Auf eine ebene Fläche gelegt, ruht der Schädel mit den Hinterhaupts-  
konchylen und der unteren Hälfte der Hinterhauptsschuppe auf, die kleinen  
*Processus mastoidei* erreichen die Unterlage nicht.

Die *Norma occipitalis* bildet ein Fünfeck, die grösste Weite liegt in der  
Gegend der Parietalhöcker, unterhalb derselben fallen die *Ossa parietalia*  
fast vertikal ab.

*Norma basilaris*, Knochenfortsätze und *Protuberantia occipitalis* sind  
schwach entwickelt.

Das Verhalten des *Foramen occipitale* ist aus der folgenden Tabelle  
zu ersehen, in welcher gleich alle drei Schädel berücksichtigt sind:—

Anthr. Cat. 2.	Anthr. Cat. 1.	Anthr. Cat. 3.	
37	36	33	Sagittaler Durchmesser des <i>Foramen occipitale</i> .
30	31	28	Transversaler Durchmesser des <i>Foramen occipitale</i> .
81·0	86·1	82·3	Index d. For. occ., d.i. $\frac{\text{transversaler Durchm.} \times 100}{\text{sagittaler Durchm.}}$
Sieht nach unten und etwas nach vorne	Sieht gerade nach unten	Sieht nach unten und etwas nach vorne	Richtung des <i>Foramen occipitale</i> in dem nach der Frankfurter Horizontalebene orientirten Schädel.

#### GESICHTSSCHÄDEL.

Die Gegend der Stirnhöcker ist gut modellirt, zwischen ihnen springt  
der Knochen noch etwas mehr vor, so dass das Stirnbein in der Mitte  
einen ganz schwach entwickelten Kiel zeigt. Die *Arcus superciliares*  
heben sich sehr wenig ab und sind beiderseits von einem *Foramen supraorbitale* durchbohrt. Die *Intraorbitaldistanz* ist gross. Die *Fissura orbitalis inferior* ist weit, besonders in ihrem äusseren Ende. Die *Ossa nasalia* sind konkav und bilden mit einander einen Winkel von nahezu 180°. Die *Apertura pyriformis* ist breit, die *Spina nasalis anterior* springt vor.



Die unbedeutende Prognathie ist hauptsächlich nasal, zum kleineren Theile alveolar. Der erhaltene linkseitige 1. Incisivus springt nicht vor. Die Jochbeine laden weit aus. Der Processus alveolaris des Os maxillare ist breit, der harte Gaumen ist parabolisch, die Knochensubstanz reicht proximal noch 5 mm. über den 3. Molaris hinaus.

Der Gesichtsschädel ist deutlich asymmetrisch, was dadurch hervorgerufen ist, dass das rechte Os maxillare zum Theile kleinere Dimensionen hat als das linke.

*Anthr. Cat.* 1 (Tafel XXVII und XXVIII).

#### HIRNSCHÄDEL.

In der Norma verticalis fällt dieser Schädel gegen den vorigen durch seine grössere Breite auf. Die Beschaffenheit der Nähte lässt auf ein jugendliches Individuum schliessen. Dieser Schädel ist ausgesprochener kryptozyg.

Norma lateralis. Rechts Articulatio pterygo-parietalis, Naht 10 mm. lang, links ist ein 16 mm. breites, 6 mm. hohes Os epiptericum eingeschaltet. In der Gegend des Asterion 5 Ossicula Wormii.

Auf eine ebene Fläche gelegt, ruht der Schädel mit den Zähnen des rechten Oberkiefers <sup>1</sup> und der unteren Hälfte der Hinterhauptschuppe auf, die Hinterhauptscondylen und die kleinen Processus mastoidei berühren die Unterlage nicht.

Norma occipitalis. Die Parietalhöcker laden stark aus, unterhalb derselben konvergiren die Ossa parietalia etwas nach unten zu.

In der Gegend, wo die Sutura sagittalis mit der Sutura lambdoidea zusammentreffen soll, liegen sechs Schaltknochen neben und über einander. Sie bilden ein Band von 81 mm. Breite und 30 mm. Höhe. Die Lage des Lambda lässt sich nicht feststellen.

Norma basilaris. Die Leisten und Knochenfortsätze für Muskel sind an diesem Schädel stärker entwickelt als am vorigen.

#### GESICHTSSCHÄDEL.

Die Stirne ist breit und gut gefüllt. In die Diploe des Os frontale sind auf beiden, besonders aber auf der linken Seite tiefe Rinnen für die supraorbitalen Gefässe gegraben, welche die Orbita durch ein Foramen supraorbitale verlassen. Das rechte Os frontale trägt eine kreisförmige narbige Einbuchtung, mit einem scharfen Rande nach unten. Median davon eine zweite seichtere Einbuchtung. (Wahrscheinlich Knochennarben nach einem pathologischen Process.) Die Naht zwischen Ossa nasalia und Os frontale liegt tief, die ersteren sind stark konkav, und schliessen mit einander einen nach unten immer flacher werdenden Winkel ein. Die Apertura pyriformis geht unten glatt ohne deutliche Ränder in die Vorderfläche des Processus alveolaris über, dazwischen springt jedoch die Spina nasalis anterior deutlich vor. Da das innere Paar der Schneidezähne erhalten ist, lässt sich die Prognathie an diesem Schädel vollständig analysiren.

<sup>1</sup> Nicht beider Oberkiefer wegen der unten erwähnten Asymmetrie.

Die im Ganzen nur sehr geringe Prognathie ist etwa zu gleichen Theilen nasal und alveolar. Dentale Prognathie ist gar nicht vorhanden, da die vorderen Schneidezähne ganz gerade stehen. Der harte Gaumen hat parabolische Form.

Auch dieser Schädel ist im Gesichtsantheil asymmetrisch; das linke Os maxillare ist theilweise kleiner als das rechte.

*Anthr. Cat.* 3 (Tafel XXIX).

Dieser Schädel ist in einem viel schlechteren Erhaltungszustande als die beiden vorhergehenden. Er hat augenscheinlich unbegraben, den Witterungseinflüssen ausgesetzt, gelegen. An ihm fällt vor allem eine ungewöhnliche Kleinheit auf. Er kann aber durchaus keinem jugendlichen Individuum angehört haben; die Sutura coronalis und S. sagittalis sind vollständig verknöchert. Er weicht nicht nur in der Grösse, sondern auch in den Verhältnissen von den beiden vorhergehenden ab; das Schädeldach ist relativ viel niedriger, die Stirne ist schmaler. Wegen der ebenfalls steil aufgestellten Stirne, der ganz unbedeutenden Prognathie und der grossen Intraorbitaldistanz charakterisirt er sich aber auch als Buschmannschädel.

In der anschliessenden Tabelle sind die an den Schädeln genommenen Masse<sup>1</sup> zusammengestellt; sie gibt Aufschluss über Dinge, die bisher unerwähnt blieben, z. B. die Grösse der Orbita, den Inhalt der Schädel, u.s.w., ferner über die Proportionen der einzelnen Theile des Schädels zu einander.

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<sup>1</sup> Bei der Auswahl der Masse wurde auch Rücksicht auf eine zusammenfassende Arbeit von *Frank C. Shrubbsall* über Buschmann-Schädel und Skelette genommen.

*Frank C. Shrubbsall*, Notes on Some Bushman Crania and Bones from the South African Museum, Capetown. Annals of the South African Museum. Vol. V, Part V, Oct., 1907. In dieser Arbeit werden die Strandlooper, Buschmänner und Hottentotten auseinander gehalten. Das obenbehandelte osteologische Material aus dem Transvaal Museum reiht sich nach dem Vergleiche der Messungsergebnisse mit den von *Frank C. Shrubbsall* mitgetheilten Massen in die Gruppe der Buschmänner ein. Die oben erwähnte Stenokrotaphie, das starke Ausladen der Stirnparthie und andere Eigenthümlichkeiten werden auch von *Frank C. Shrubbsall* beobachtet. Auch andere Befunde dieses Autors konnte ich bestätigen: eine Furche über dem Processus mastoideus, deutliche Fossae incisivae und caninae am Oberkiefer, die Seichtheit der Fossa sigmoidea am Unterkiefer.

## MASSE UND INDICES DER SCHÄDEL.

Anthr. Cat. 2.	Anthr. Cat. 1.	Anthr. Cat. 3.	
180	184	170	Grösste Länge, von der Glabella nach dem entferntesten Punkte des Occiput.
133	143	128	Grösste Breite (liegt bei allen drei Schädeln vorne und unterhalb der Parietalhöcker).
127	130	111	Entfernung des Basion vom Bregma.
97	90	89	Entfernung des Basion vom Nasion.
83	83	89	Entfernung des Basion vom oberen Alveolarpunkt.
109	115	97	Breite zwischen den beiden Pterien.
112	115	99	Breite zwischen den beiden Stepanmen.
89	97	89	Kleinste Stirnbreite.
122	126	115 <sup>1</sup>	Grösste Joehbogenbreite.
58	57	60	Grösste Breite zwischen den Alveolarfortsätzen des Oberkiefers.
52	51	37	Aussere Gaumenlänge, vom oberen Alveolarpunkt zur Spina nasalis posterior.
41	43	44	Entfernung des Nasion von der Spina nasalis anterior.
59	62	60	Entfernung des Nasion vom oberen Alveolarpunkt.
38	38	33	Breite der Orbita, vom Dakryon zum äusseren Rande der Orbita.
37	39	34	Höhe der Orbita, senkrecht auf das vorige Mass, vom Margo supraorbitalis zum M. infraorbitalis.
34	33	29	Grösste Breite der Orbita, vom inneren zum äusseren Rande der Orbita.
40	33	29	Höhe der Orbita, senkrecht auf das vorige Mass.
40	43	39	Entfernung des einen Dakryon vom anderen.
33	34	29	Grösste Breite zwischen den äusseren Rändern der beiden Orbitallhöhlen.
33	34	29	Grösste Breite der Apertura pyriformis.
21	20	25	Länge der Ossa nasalia in der Median-Ebene.
93	95	92	Sagittaler Durchmesser des Foramen occipitale.
24	22	23	Transversaler Durchmesser des Foramen occipitale.
15	17	17	Sagittaler Umfang, vom Nasion zum Opisthion.
37	36	34	Frontal-Curve: Entfernung des Nasion von der Sutura coronalis in der Sagittal-Ebene.
30	31	28	
360	380	340	
127	137	117	

<sup>1</sup> Da die Joehbogen bei *Anthr. Cat. 3* nicht vollständig erhalten sind, ist dieses Mass sowie auch der daraus berechnete Index unsicher.

Anthr. Cat. 2.	Anthr. Cat. 1.	Anthr. Cat. 3.	
123	21	116	Parietal-Curve: Entfernung der Sutura coronalis vom Lambda in der Sagittal-Ebene.
110	21	107	Occipital-Curve: Entfernung des Lambda vom Opisthion.
504	521	475	Grösster Horizontumfang.
285	307	270	Transversaler Umfang von einen Auricularpunkt zum anderen, senkrecht auf die Frankfurter Ebene.
1377.9 cm.	1426.9 cm.	1022.9 cm.	Capacität (bestimmt mit den Samenkörnern von Sorghum vulgare).
73.9	77.7	75.3	Längen-Breiten Index, d.i. $\frac{\text{grösste Breite} \times 100}{\text{grösste Länge}}$
70.6	70.1	65.3	Längen-Höhen Index, d.i. $\frac{\text{Entfernung des Basion vom Bregma} \times 100}{\text{grösste Länge}}$
94.7	90.9	86.7	Breiten-Höhen Index, d.i. $\frac{\text{Entfernung des Basion vom Bregma} \times 100}{\text{grösste Breite}}$
48.4	49.2	54.5 <sup>2</sup>	Morphologischer Ober-Gesichts Index, d.i. $\frac{\text{Entfernung des Nasion vom oberen Alveolarpunkt} \times 100}{\text{grösste Jochbogenbreite}}$
90.7	85.7	85.3	Orbital Index, d.i. $\frac{\text{Höhe der Orbita} \times 100}{\text{Breite der Orbita (vom Dakryon aus)}}$
58.5	51.2	52.3	Nasen Index, d.i. $\frac{\text{grösste Breite der Apertura pyriformis} \times 100}{\text{Entfernung des Nasion von der Spina nasalis ant.}}$
96.9	92.2	100.0	Alveolar Index, d.i. $\frac{\text{Entfernung des Basion vom oberen Alveolarpunkt} \times 100}{\text{Entfernung des Basion vom Nasion}}$

<sup>1</sup> Bei *Anthr. Cat. 1* lässt sich die Lage des Lambda nicht feststellen wegen der oben erwähnten Schaltknochen in dieser Gegend.

<sup>2</sup> Da die Jochbogen bei *Anthr. Cat. 3* nicht vollständig erhalten sind, ist dieses Mass sowie auch der daraus berechnete Index unsicher.



Wenn man der üblichen Eintheilung folgt und die gebräuchlichen Benennungen anwendet, sind die Schädel nach ihren Indices folgendermassen zu bezeichnen:

Schädel *Anthr. Cat.* 2 ist dolichocephal, chamaecephal, metriocephal, chamaeprosop, megasem, platyrhin, orthognath, und mesencephal.

Schädel *Anthr. Cat.* 1 ist mesocephal, chamaecephal, metriocephal, chamaeprosop, mesosem, mesorhin, orthognath, und mesencephal.

Schädel *Anthr. Cat.* 3 ist mesocephal, chamaecephal, tapeinocephal, leptoprosop, mesosem, platyrhin, mesognath, und mikrencephal.

#### UNTERKIEFER.

(Tafel XXX, Figur 1 und 2.)

*Anthr. Cat.* 2.—Der Unterkiefer ist gedrunken, der Ramus breit. Der Winkel, welchen die Symphysen-Tangente mit der Alveolarebene beschreibt, ist ungefähr ein rechter, so dass man von einem neutralen Kinn sprechen kann.<sup>1</sup>

Wenn die Untersuchung der Mandibula eines Buschmanns den Befund, eines "neutralen Kinns" ergibt, so kann dieses Kinn beim Lebenden immer noch als "fliehendes" erschienen sein, weil die Alveolarebene (beider Kiefer) schräg von vorne unten nach hinten oben stehen kann so dass dann das Kinn scheinbar zurücktritt.

Man kann am Unterkiefer vorne median eine Protuberantia mentalis unterscheiden, die Tubera mentalia rechts und links von ihr lassen sich jedoch nicht differenzieren. Innenseite: die Spina mentalis ist schwach ausgebildet, die Linea mylohyoidea ist undeutlich.

*Anthr. Cat.* 1.—Dieser Unterkiefer ist kürzer als der vorige, und auch zu kurz für seinen eigenen Oberkiefer; seine Zugehörigkeit zu demselben ist aber deswegen kaum zu bezweifeln, da die Kauflächen der Praemolares und Molares gut aufeinander passen, und Konservierung und Färbung der oberen und unteren Zahnreihe gleich sind.

Das Kinn ist nicht wie bei *Anthr. Cat.* 2 neutral, sondern sogar etwas negativ. Die Protuberantia mentalis ist kaum herausmodellirt, die beiden Tubera mentalia sind gut zu unterscheiden. Innenseite: von einer Spina mentalis kann kaum die Rede sein, die Linea mylohyoidea ist verwischt.

<sup>1</sup> *H. Klaatsch* sieht in einer durch die Alveolen des Unterkiefers gelegten Ebene die Horizontale des Unterkiefers. Senkrecht auf diese Horizontalebene wird durch das Incision, d.i. den vordersten obersten Punkt der Alveole zwischen den beiden mittleren Schneidezähnen, die Incision-Vertikale errichtet. Eine vom Incision an den vorspringendsten Theil der Mandibula gelegte Tangente heisst Symphysen-Tangente. Ist der Winkel der Symphysen-Tangente mit der Alveolarebene grösser als ein rechter, so spricht *H. Klaatsch* von einem positiven Kinn, z.B. beim Europäer, ist er kleiner, so heisst es negatives Kinn, z.B. beim Australier, ist der Winkel ein rechter, so ist das Kinn neutral.

MASSE DER UNTERKIEFER UND DER GESICHTSSCHÄDEL MIT DEN  
UNTERKIEFERN.

Anthr. Cat. 2.	Anthr. Cat. 1.	
25	29	Höhe der Symphyse des Unterkiefers.
85	83	Grösste Breite des Unterkieferkörpers.
119	112	Grösste Breite der Processus condyloidei.
30	35	Entfernung der Kaufläche d. Schneidezähne vom unteren Rande des Kinns.
98	93	Entfernung des Basion vom Kinn.
93	100 <sup>1</sup>	Entfernung des Nasion vom unteren Rande des Kinns.
54	59	Entfernung der Spina nasalis ant. vom unt. Rande des Kinns.
63	70	Entfernung des Nasion von der Kaufläche der Schneidezähne des Oberkiefers.
76·2	79·4	Gesichts Index, d.i. Entfernung des Nasion vom unteren Rande des Kinns × 100 Grösste Jochbogenbreite

## ZÄHNE.

(Tafel XXX, Figur 1 und 2.)

*Anthr. Cat. 2.*

Oberkiefer.—1. Praemolaris rechts, 2. Praemolaris links, 1. und 2. Incisivus rechts sind ausgefallen, 1. Praemolaris links abgebrochen, alles anscheinend post mortem. Die Alveole des 2. Incisivus rechts ist nach hinten zu vergrössert und gibt Raum für einen überzähligen Zahn.

Unterkiefer.—Das innere Paar der Incisivi ist ausgefallen, augenscheinlich erst post mortem.

Im Ober- wie im Unterkiefer sind die ersten Molares am grössten, die zweiten etwas kleiner, die dritten am kleinsten; letztere sind aber doch noch vollständig entwickelt. Die Kauflächen aller Zähne sind sehr stark abgeschliffen, so dass sich über die Anzahl der Höcker mit Sicherheit leider nichts mehr aussagen lässt.

*Anthr. Cat. 1.*

Oberkiefer.—Das äussere Paar der Incisivi ist ausgefallen, anscheinend post mortem. Nach der Kleinheit der Lücken zu urtheilen, müssen die beiden äusseren Incisivi wesentlich kleiner gewesen sein, als die beiden inneren.

Unterkiefer.—1. Praemolaris rechts ist, augenscheinlich erst post mortem, ausgefallen.

<sup>1</sup> Die Entfernung des Nasion vom unteren Rande des Kinns ist bei *Anthr. Cat. 1* kleiner als die Summe der Entfernung des Nasion von der Kaufläche der Schneidezähne des Oberkiefers und der Entfernung der Kaufläche der Schneidezähne vom unteren Rande des Kinns, da die Schneidezähne des Unterkiefers hier hinter die Zahnreihe des Oberkiefers zu stehen kommen (siehe oben).

Das Grössenverhältnis der Molares unter einander ist dasselbe wie bei *Anthr. Cat. 2*. Die Kauflächen der 3. Molares berühren sich nicht, die Krone des unteren Paares trägt einen Ringwall von Schmelzfalten. Die Kauflächen der 1. und 2. Molares in beiden Kiefern sind abgeschliffen, zwar nicht so hochgradig wie bei *Anthr. Cat. 2*, über die Anzahl der Höcker lässt sich jedoch auch nichts Sicheres mehr sagen.

*Anthr. Cat. 3*.

Alle Zähne im Oberkiefer sind theils ausgefallen, theils bis auf die Wurzeln abgebrochen (post mortem).

#### MASSE UND INDICES DER ZÄHNE.

Anthr. Cat. 2.	Anthr. Cat. 1.	
36 <sup>1</sup>	38	rechts } im Oberkiefer links } rechts } im Unterkiefer links }
—	38	
40	—	
39	40	
30	42·2	Zahn-Index, d.i. <u>Länge der Kaufl. d. Praem. u. Mol. im Oberk. × 100</u> Entfernung des Basion vom Nasion

Nach der bisher üblichen Eintheilung und Benennung wären *Anthr. Cat. 2* als mikrodont und *Anthr. Cat. 1* als mesodont zu bezeichnen.

#### WIRBELSÄULE.

##### LENDENWIRBELSÄULE.

Es sei nur die Lendenwirbelsäule genauer besprochen, weil hauptsächlich hier verschiedene Rassenmerkmale herausgefunden und beschrieben wurden, und weil diese Körpergegend auch für die Buschmannrasse besonders charakteristisch ist. Das Wesentliche an der Sache ist die Untersuchung der Biegung der Lendenwirbelsäule. Nach der üblichen Methode sucht man sich über diese zu orientiren, indem man die vorderen<sup>2</sup> und hinteren Höhen in der Medianebene der Wirbelkörper misst. Je nach dem die vorderen oder die hinteren Masse grösser sind, schliesst man, dass die Lendenwirbelsäule nach vorne konvex oder konkav ist. Um verschiedene Skelette leicht vergleichen zu können, werden die direkten

<sup>1</sup> Da der 1. Molaris fehlt, wurde das Mass von dem proximalen Rande der Kaufläche des Caninus genommen.

<sup>2</sup> Die Messpunkte in der Mitte des vorderen Randes der Wirbelkörper können nicht immer wörtlich ganz vorne am Rande genommen werden, da derselbe oft schräg ansteigt, und erst einen oder eineinhalb Millimeter gegen den Körper zu seine grösste Höhe erreicht

Zahlen durch Indices ersetzt. Die Messungen und Indices der beiden Skelette seien im Folgenden mitgetheilt:—

Anthr. Cat. 2.				Höhe der Wirbelkörper in der Medianlinie.		Index, d.i.
				vorne.	hinten.	$\frac{\text{hintere Höhe} \times 100}{\text{vordere Höhe.}}$
1. Lendenwirbel	..	..	..	22	24	109·0
2. Lendenwirbel <sup>1</sup>	..	..	..	21	23	109·5
3. Lendenwirbel	..	..	..	22	24	109·0
4. Lendenwirbel	..	..	..	22	22	100·0
5. Lendenwirbel	..	..	..	24	21	87·5
Summe der Höhen	..	..	..	111	114	102·7 (Gesamt-Index)

Anthr. Cat. 1.				Höhe der Wirbelkörper in der Medianlinie.		Index, d.i.
				vorne.	hinten.	$\frac{\text{hintere Höhe} \times 100}{\text{vordere Höhe.}}$
1. Lendenwirbel	..	..	..	24	26	108·3
2. Lendenwirbel	..	..	..	24	25	104·1
3. Lendenwirbel	..	..	..	24	24	100·0
4. Lendenwirbel	..	..	..	25	24	96·0
5. Lendenwirbel	..	..	..	27	22	81·4
Summe der Höhen	..	..	..	124	121	97·5 (Gesamt-Index)

Die Deutung der vorstehenden Indices ist ohne weiteres klar. Sie bezeichnen das procentuelle Verhältniss der vorderen Höhe zur hinteren: ist der Index über 100, so überwiegt die vordere Höhe, und eine Reihe solcher Wirbelkörper über einandergelegt bildet eine nach vorne konvexe Kurve. Nun liegen aber in der Natur leider die Wirbelkörper nicht so unmittelbar auf einander, sondern dazwischen sind die Bandscheiben, welche das ganze Verhältniss umkehren können, was auch in dem vorliegenden Falle eintritt. Einen zweiten Fehler macht man bei der Anwendung der üblichen Methode, wenn man die vorderen und die hinteren Höhen der Wirbelkörper addirt, daraus einen Gesamt-Index berechnet, und aus diesem dann ableitet, ob die Wirbelsäule nach vorne konvex oder konkav ist. Die Verhältnisse liegen nicht so einfach, um das zu erlauben: der Wirbelkörper des ersten und zweiten Lumbalwirbels ist hinten höher als vorne, der dritte hat planparallele Gelenksflächen, die vordere Höhe des

<sup>1</sup> Die Zugehörigkeit dieses Wirbels zum übrigen Skelett ist zweifelhaft, weil er aus der Reihe springt.



vierten und fünften ist grösser als die hintere (*Anthr. Cat.* 1). Daraus könnte man, mit Vernachlässigung der Bandscheiben, nur schliessen, der obere Theil der Lumbarwirbelsäule sei nach vorne konkav, der untere nach vorne konvex. Niemals aber kann man "konkav" und "konvex" addiren,<sup>1</sup> und aus dem Überwiegen der einen oder anderen Eigenschaft schliessen, das ganze Ding sei jetzt konkav oder konvex; es wird immer konkav-konvex bleiben, d.h. zweimal, nach hinten und nach vorne, ausgebogen sein.

*Anthr. Cat.* 1 wäre mit seinem Gesamt-Index von 97·5 "kurto-rachic," d.h. die Lendenwirbelsäule wäre nach vorne ausgesprochen konvex. *Anthr. Cat.* 2 dagegen wäre mit dem Index von 102·7 das andere Extrem, nämlich "kilorachic," d.h. die Lendenwirbelsäule wäre nach vorne konkav.

Nach den Untersuchungen am Lebenden wissen wir aber, dass der Buschmannrasse eine ausserordentlich starke Beckenneigung zukommt, der untere Theil der Lendenwirbelsäule muss daher stets stark nach vorne konvex sein. Aus den an den Lendenwirbelkörpern gefundenen Verhältnissen darf man daher nicht ohne weiteres einen Schluss auf das Verhalten der ganzen Lendenwirbelsäule ziehen, da die Bandscheiben beim Buschmann offenbar besonders dick und am vorderen Rande höher sein müssen.<sup>2</sup>

#### OS SACRUM.

(Tafel XXXI, Figur 3 und 4.)

*Anthr. Cat.* 2.

Mit dem Os sacrum ist der erste Wirbel des Os coccygis knöchern verwachsen; das Os sacrum erscheint dadurch auffallend lang und schmal.

*Anthr. Cat.* 1.

Das Os sacrum besteht nur aus vier Wirbeln. Der fünfte Lendenwirbel hat keine Alae magnae entwickelt, am Os ilei befindet sich auch keine Artikulation für solche.

<i>Anthr. Cat.</i> 2.	<i>Anthr. Cat.</i> 1.	
99	78	Länge des Os sacrum, mit dem Bandmass an der vorderen Fläche gemessen.
90	74	Länge d. Os sacr., Projectionsmass vom Promont. zum unteren Rande des letzten Kreuzbeinwirbels.
87	90	Breite des Os sacrum zwischen d. äusserst. Punkten der Alae.
96·7	121·4	Index, d.i. $\frac{\text{Breite des Os sacrum} \times 100}{\text{Länge des Os sacrum (Projectionsmass)}}$ .

<sup>1</sup> Diese Zahlen und Indices, sowie manche andere Masse und Indices, sind in dieser Arbeit nur mitgetheilt, weil sie helfen, das osteologische Material zu bestimmen im Vergleiche mit anderem, bisher auf dieselbe Art und Weise veröffentlichten Material. Damit ist die Nothwendigkeit aller dieser Masse und Indices aber nicht bewiesen; man würde voraussichtlich mit weniger Zahlen und Indices ebenso weit kommen, wenn statt dessen mehr anatomische Beschreibungen und Abbildungen der Objekte vorliegen würden.

<sup>2</sup> Vergl. *Frank C. Shrubbsall*, l.c., p. 256.

*W. L. H. Duckworth*, *Morphology and Anthropology*, p. 284.

*Anthr. Cat.* 2.—Der mit dem Os sacrum knöchern verwachsene Wirbel des Os coccygis ist bei der Ermittlung der Längsmasse nicht mitgemessen. Der berechnete Index 96·7 bedeutet Dolichohirie, d.i. ein langes Kreuzbein.

Der Index wurde in der üblichen Weise berechnet aus der Länge als Projectionsmass. Die Biegung des Os sacrum kommt hiebei nicht zum Ausdruck. Das sie im vorliegenden Falle bedeutend ist, zeigt der Unterschied von 9 mm. zwischen dem Masse längs der konkaven Vorderfläche des Os sacrum, und dem Projectionsmasse.

*Anthr. Cat.* 1.—Die Längsmasse und der Index lassen sich nicht ohne weiteres mit anderen Befunden vergleichen, wegen der oben erwähnten Anomalie (das Os sacrum besteht nur aus vier Wirbeln).

## LANGE RÖHRENKNOCHEN.

### OBERE EXTREMITÄT.

#### Humerus.

*Anthr. Cat.* 2.—Schaft gerade, "Torsion" (Winkel der Achse des Caput humeri mit der Achse der Condylen) ist geringer<sup>1</sup> als beim Europäer (Merkmal primitiver Rassen).

*Anthr. Cat.* 1.—Knochen graciler als *Anthr. Cat.* 2, Schaft und "Torsion" wie oben. Die Fossa radialis (Fossa anterior minor) ist tiefer als die Fossa coronoidea (Fossa anterior major).

#### Unterarmknochen.

Bei beiden Skeletten schneidet die Unterarmachse in weniger schrägem Winkel die Oberarmachse, als das beim Europäer die Regel ist (Merkmal primitiver Rassen).

•Die Ulna beider Skelette ist stark gebogen, bei *Anthr. Cat.* 1 biegt sie mit ihrem distalen Ende ganz gegen den Radius um, und artikuliert nur mit diesem Knochen.

Anthr. Cat. 2.	Anthr. Cat. 1.	
295	280	rechts } Länge des Humerus
286	278	links }
244	238	rechts } Länge der Ulna.
241	237	links }
230	224	rechts } Länge des Radius.
227	223	links }

Bei beiden Skeletten sind alle langen Röhrenknochen der rechten oberen Extremität merklich länger als die der linken, was beweist, dass

<sup>1</sup> Da die Winkel mit einer improvisirten Einrichtung nicht genau genug abgelesen werden konnten, wurde von der Veröffentlichung der Zahlen abgesehen, und nur die ungefähre Bezeichnung der Winkelgrösse mitgetheilt.

beide Individuen rechtshändig waren. Der Unterschied von 9 mm. (oder 3 Procent) zwischen rechtem und linken Humerus von *Anthr. Cat. 2* ist sogar ungewöhnlich gross. Es aber liegt kein Anhaltspunkt vor, an der Zusammengehörigkeit dieser Knochen zu zweifeln.

#### UNTERE EXTREMITÄT.

##### Femur.

*Anthr. Cat. 2* (Tafel XXXI, Fig. 2).

Der Schaft des Femur ist gebogen, mit der Konvexität nach vorne, nach hinten springt eine ganz ausserordentlich stark entwickelte Linea aspera vor, "Pilaster"-Form des Femur. Das Caput femoris ist gross, das Collum kurz und dick. Der Winkel zwischen Schaft und Hals liegt zwischen den auch für den Europäer geltenden Grenzen.

*Anthr. Cat. 1.*

Der Knochen ist graciler als bei *Anthr. Cat. 2*, der Schaft ist gerader, die Linea aspera springt weniger vor. Das Caput femoris ist klein, das Collum recht kurz und gedrunken. Der Winkel zwischen Schaft und Hals ist kleiner als bei *Anthr. Cat. 1*, aber auch noch innerhalb der obgenannten Grenzen.

Folgende sind die Masse der beiden Femora und die daraus berechneten Indices:—

Anthr. Cat. 2.	Anthr. Cat. 1.	
401	405	r. } Grösste Länge des Femur.
403	406	l. }
400	401	r. { Schräge Länge des Femur, d.i. Länge des Femur von
401	403	l. { einer Ebene aus, welche beide Condylen des Femur
		berühren, u. die senkrecht auf der Unterlage des
		Femur steht.
1	4	r. } Differenz zwischen grösster und schräger Länge.
2	3	l. }
23 <sup>1</sup>	24	Sagittaler } Durchmesser des Schaftes unmittelbar
25	28	Transversaler } unterhalb des Trochanter minor.
92·0	85·7	Index, $\frac{\text{Sagittaler Durchmesser} \times 100}{\text{Transversaler Durchmesser}}$
33	29	Sagittaler } Durchmesser des Schaftes in seiner
21	22	Transversaler } Mitte.
157·1	131·8	Index, $\frac{\text{Sagittaler Durchmesser} \times 100}{\text{Transversaler Durchmesser}}$

<sup>1</sup> Die Differenzen der Quermasse von Femur und Tibia zwischen rechts und links waren stets kleiner als ein Millimeter.

Aus der Grösse der Differenz der schrägen und geraden Länge des Femurs kann man einen ungefähren Schluss auf die Stellung der Femurachse zur Kniegelenksachse ziehen. Bei *Anthr. Cat.* 2 ist der Unterschied zwischen schräger und gerader Länge des Femur sehr gering, das Femur muss also ziemlich gerade auf der Kniegelenksachse gestanden haben, der Schaft von *Anthr. Cat.* 1 dagegen steht viel schräger. Viele bekannte Femora primitiver Menschenrassen stehen auffallend gerade auf der Kniegelenksachse.

Der Index der Durchmesser unmittelbar unter dem Trochanter minor lehrt, dass eine Abflachung dieser Gegend im Sinne des sagittalen Durchmessers, die sogenannte Platymerie, nicht besteht.

Dagegen ist die Pilasterform, bedingt durch eine starke Ausbildung der Linea aspera femoris bei beiden Oberschenkelknochen ausgesprochen da, bei *Anthr. Cat.* 2 in einem selten hohen Grade. Der Index 157·1, welcher dieser Verhalten ausdrückt, ist ganz ausnahmsweise hoch.

### Tibia.

*Anthr. Cat.* 2 (Tafel XXXI, Fig. 1).

Die laterale Hälfte der proximalen Gelenksfläche ist bis auf eine seichte Delle in der Mitte ganz konvex; die Neigung der lateralen Hälfte der proximalen Facies articularis tibiae zur Konvexität ist für hockende Völker charakteristisch.

Das proximale Ende der Tibia ist etwas retrovertirt. Der Schaft ist seitlich deutlich abgeflacht.

*Anthr. Cat.* 1.

Diese Tibia ist etwas schwächer, aber länger als die eben beschriebene. Sie zeigt dieselben oben erwähnten Eigenthümlichkeiten, die Abflachung in geringerem Grade.

Anthr. Cat. 2.	Anthr. Cat. 1.	
334	357	r. } Grösste Länge der Tibia, <sup>1</sup> von der Eminentia inter-
333	357	l. } condyloidea bis zur Spitze des Malleolus internus.
332	355	r. } Länge der Tibia, <sup>1</sup> ohne Eminentia intercondy-
332	355	l. } loidea.
320	343	r. } Länge der Tibia, <sup>1</sup> ohne Eminentia intercondy-
320	343	l. } loidea und Malleolus internus.
35	29	Sagittaler Durchmesser der Tibia } in der Höhe des Transversaler Durchmesser der Tibia } Foramen nutritium. <sup>2</sup>
20	31	
57·1	72·0	Index, $\frac{\text{transversaler Durchmesser} \times 100}{\text{Sagittaler Durchmesser}}$

<sup>1</sup> Da verschiedene Autoren die Länge der Tibia von verschiedenen Stellen nehmen, wurden drei Möglichkeiten berücksichtigt.

<sup>2</sup> Das Foramen nutritium liegt bei beiden Skeletten an der linken Tibia höher als an der rechten; um an identischen Stellen zu messen, wurden die Messpunkte von den linken auf die rechten Tibien übertragen.



Der ungewöhnlich niedrige Index 57·1 bei der Tibia von *Anthr. Cat. 2* zeigt, dass hier Platyknemie in ausserordentlich hohem Grade vorliegt.

### Fibula.

Wegen Mangels an Vergleichsmaterial seien bloss die Masse mitgetheilt.

Anthr. Cat. 2.	Anthr. Cat. 1.	
320	345	rechts }
321	345	links } Länge der Fibula.

### LÄNGENVERHÄLTNISSE DER LANGEN RÖHRENKNOCHEN ZU EINANDER.<sup>1</sup>

Anthr. Cat. 2.	Anthr. Cat. 1.	
78·0	80·0	$\frac{\text{Länge des Radius} \times 100}{\text{Länge des Humerus}^2}$
73·2	69·0	$\frac{\text{Länge des Humerus} \times 100}{\text{Länge des Femur}^2}$
82·4	87·4	$\frac{\text{Länge der Tibia} \times 100}{\text{Länge des Femur}}$
68·7	66·2	$\frac{\text{Länge des Humerus} + \text{Länge des Radius} \times 100}{\text{Länge des Femur} + \text{Länge der Tibia}}$

Verschiedene Gruppen der Menschheit verhalten sich verschieden in Bezug auf diese Indices. Turner hat das einschlägige Material zusammengestellt.

Aus der Länge einzelnen Röhrenknochen kann man einen ungefähren Schluss auf die gesammte Körperhöhe ziehen. Leider ist aber das Material von vollständigen Buschmann-Skeletten, die man zum Vergleiche heranziehen kann, sehr gering, ausserdem sind die Höhen von Skeletten einer Rasse, die ungenügend bekannt ist, naturgemäss unsicher. Es ist daher vielleicht rathsamer, über eine bloss Schätzung der Höhen nicht hinauszugehen; nach einer solcher mögen beide Skelette zwischen 142 und 145 Centimeter hoch sein.<sup>3</sup>

<sup>1</sup> Aus den möglichen Kombinationen wurden die vier von *W. L. H. Duckworth* empfohlenen, ausgewählt; l.c. p. 327.

<sup>2</sup> Zum Vergleiche wurden bei beiden Skeletten die Knochen der rechten oberen und linken unteren Extremität herangezogen.

<sup>3</sup> Nach den Anordnungen von *Dr. Gunning* werden die beiden Skelette im Transvaal-Museum nicht reconstruirt, um nicht nothwendigerweise Ungenauigkeiten zu begehen und die Theile weiteren Studien und Messungen zugänglich zu erhalten.



*Tafel XXV.*

1. Norma facialis.
2. Norma lateralis sinistra.
3. Norma occipitalis.

*Anthr. Cut. 2.*



1. Norma verticalis.



2. Norma basilaris.

*Anthr. Cut. 2.*



*Tafel XXVII.*

1. Norma facialis.
2. Norma lateralis dextra.
3. Norma occipitalis.

*Anthr. Cat.* 1.





1. Norma verticalis.



2. Norma basilaris.

*Authr. Cat. 1.*



1. Norma lateralis dextra.



2. Norma verticalis.

*Tafel XXIX.*

*Anthr. Cat. 3.*

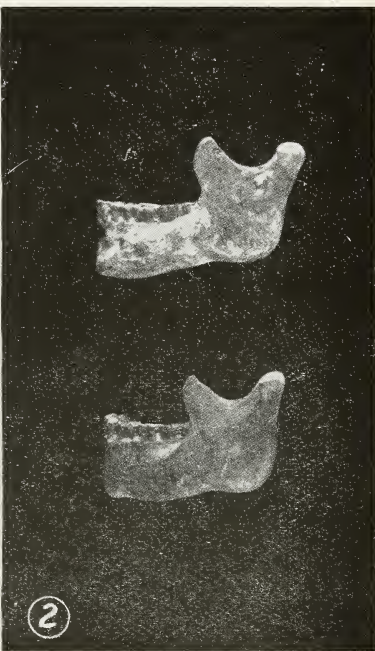
*Anthr. Cat. 2.*



*Anthr. Cat. 1.*

**Mandibula, von oben.**

*Anthr. Cat. 2.*



*Anthr. Cat. 1.*

**Mandibula, von der linken Seite.**



*Tafel XXX.*

*Anthr. Cat. 2.*

*Anthr. Cat. 1.*

**Linke Scapula von hinten.**





1. Rechte Tibia, von innen.
3. Os Sacrum.

2. Rechtes Femur, von innen.
4. Os sacrum.





1. *Anthr. Cat.* 2.



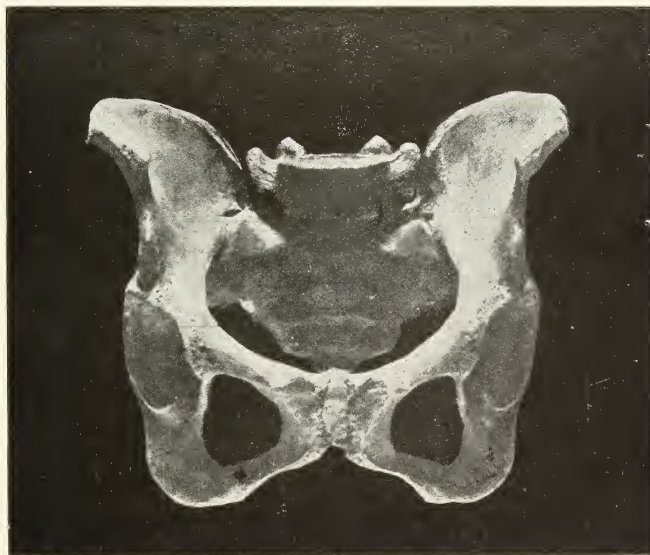
2. *Anthr. Cat.* 1.

*Tafel XXXII.*

Pelvis, von oben, senkrecht auf die Ebene des Eingangs.



1. *Anthr. Cat.* 2.



2. *Anthr. Cat.* 1.

*Tafel XXXIII.*

**Pelvis, von vorne.**



## SCHULTERGÜRTEL.

## SCAPULA.

(Tafel XXX, Fig. 3.)

Bei beiden Skeletten ist der Winkel, den die Spina scapulae mit dem Vertebralrand beschreibt kleiner als beim Europäer.

Die Masse der Länge und Breite und der daraus berechnete Index folgen:—

Anthr. Cat. 2.	Anthr. Cat. 1.	
134	125	Länge, vom Angulus superior zum Ang. inferior.
98	90	Breite, vom Rande der Facies glenoidalis zu dem Punkte des proximalen Scapularrandes, welchen die Verlängerung der Spina scapulae schneidet.
73.1	72.0	Index der Scapula, d.i. $\frac{\text{Breite der Scapula} \times 100}{\text{Länge der Scapula}}$

Der Index ist merklich kleiner als die für Europäer charakteristischen. Grössere Breite der Scapula ist ein Merkmal primitiver Menschenrassen.

## CLAVICULA.

Beide Paare Claviculae zeigen eine starke individuelle Verschiedenheit; die von *Anthr. Cat. 2* sind viel stärker S-förmig gebogen, als von *Anthr. Cat. 1*.

Anthr. Cat. 2.	Anthr. Cat. 1.	
135	132	rechts } Länge der Clavicula, vom Sternal- zum
135	135	links } Akromial-Ende.

## STERNUM.

*Anthr. Cat. 2.*

Der Ansatz der zweiten Rippe liegt normal zwischen dem Manubrium und dem Corpus sterni. Letzteres zeigt in der Höhe des Ansatzes der vierten Rippe ein medial gelegenes 9 mm. langes und 4 mm. breites Loch (Foramen sternale).

*Anthr. Cat. 1.*

Es ist nur das Manubrium sterni vorhanden. Dieses ist kurz und schmal und am unternen Ende gespalten (Fissura sterni).

Anthr. Cat. 2.	Anthr. Cat. 1.	
51	—	Grösste Länge } des Manubrium sterni.
49	—	Grösste Breite }
78	63	Grösste Länge } des Corpus sterni.
34	27	Grösste Breite }



## BECKEN.

(Tafel XXXII und XXXIII.)

*Anthr. Cat. 2.*—Das Becken ist sehr klein, schmal und hoch.*Anthr. Cat. 1.*—Bei der Beschreibung des Os sacrum wurde erwähnt, dass es nur aus vier Wirbeln besteht, der oberste Sacralwirbel fehlt, und der fünfte Lendenwirbel vertritt ihn nicht durch Ausbildung von Alae magnae. Der obere Rand des Os ilei fällt steil gegen das verkürzte Os sacrum ab. Die Ossa iliaca stehen fast vertikal, die Spinae anteriores inferiores liegen unmittelbar unter den superiores.

Der weiteren Untersuchung und der Geschlechtsbestimmung soll die Mittheilung der Masse vorausgehen. Die beiden Becken wurden vor der Messung vorsichtig rekonstruiert, trotzdem können diese Masse nicht Anspruch auf absolute Genauigkeit machen.

Anthr. Cat. 2.	Anthr. Cat. 1.	
176	169	Höhe des Os ilei von der Crista iliaca zum tiefsten Punkt der Tuberositas Osis ilei.
127	121	Breite des Os ilei zwischen der Spina anterior superior und der Spina posterior superior.
209	193	Grösste Breite zwischen den Cristae iliaca.
184	150	Entfernung zwischen den Spinae anteriores superiores.
149	149	Entfernung zwischen den Spinae anteriores inferiores.
54	84	Entfernung zwischen den Spinae posteriores superiores.
25	43	Differenz zwischen der grössten Breite zwischen den Cristae und der Entfernung der Spinae anteriores superiores.
35	1	Differenz zwischen der Entfernung der Spinae anteriores superiores und inferiores.
113	144	Entfernung zwischen den äusseren Flächen der Tuberositates ossis ischii.
87	89	Conjugata des Beckeneinganges, vom Promontorium zur Mitte des inneren Randes der Symphyse.
94	100	Grösster transversaler Durchmesser des Beckeneinganges (senkrecht auf die Conjugata des Beckeneinganges).
109	103	Conjugata diagonalis, vom unteren Rande der Symphyse zum Promontorium.
166	156	Conjugata externa (Diameter Baudelouqui) von der Spitze des fünften Lumbarwirbels zur äusseren Mitte der Symphyse.
89	104	Entfernung vom unteren (inneren) Rande der Symphyse zum unteren Rande des letzten Sacralwirbels. <sup>1</sup>
69	105	Transversaler Durchmesser des Beckenausganges zwischen den Spinae ossis ischii.
72.2	71.6	Index des Os ilei, d.i. $\frac{\text{Breite des Os ilei} \times 100}{\text{Höhe des Os ilei}}$
84.6	87.6	Becken Index, d.i. $\frac{\text{Höhe des Os ilei} \times 100}{\text{Grösste Breite zwischen den Cristae Osis ilei}}$
92.6	89.0	Index des Beckeneingangs, d.i. $\frac{\text{Conjugata des Beckeneingangs} \times 100}{\text{Transversaler Durchmesser des Beckeneingangs}}$

<sup>1</sup> Dieses Mass wurde statt der Conjugata des Beckenausganges genommen (Os coccygis fehlt beiden Skeletten).

*Anthr. Cat. 2.*—Die Masse sprechen für ein männliches Becken. Das falsche Becken ist relativ weit, das wahre relativ eng. Nach dem Index des Beckeneingangs wäre dieses Individuum mesatipellic gewesen.

*Anthr. Cat. 1.*—Trotzdem die Verhältnisse durch die Anomalie des Os sacrum verschleiert sind, machen die Masse es doch wahrscheinlich, dass der Becken ein weibliches ist. Das wahre Becken ist weiter als bei *Anthr. Cat. 2*, der transversale Durchmesser des Beckenausgangs ist weit. Dasselbe kann von der Conjugata des Beckenausgangs gegolten haben. Nach dem Index des Beckeneingangs ist dieses Skelett platypellic. Für den weiblichen Charakter dieses Beckens sprechen auch die schwachen Knochenansätze und die Weite des Arcus subpubicus.

### Geschlecht der Skelette.

Im Anschlusse an die Geschlechtsbestimmung der Becken sei die Frage des Geschlechtscharakters der übrigen Theile der Skelette behandelt, und dabei auch die Frage aufgeworfen, ob alle einzelnen Stücke nur zwei Individuen angehört haben.

Das Becken von *Anthr. Cat. 1* wurde als weibliches bezeichnet, das von *Anthr. Cat. 2* ist höchstwahrscheinlich männlich. Alle zu diesem Skelett gehörenden Knochen sind kräftig und zeigen stark entwickelte Knochenansätze, die von *Anthr. Cat. 2* dagegen sind graciler und glatter, so dass wir es allem Anscheine nach mit einem männlichen und einem weiblichen Skelette zu thun haben. Der Geschlechtscharakter der Schädel ist unsicher; der Schädel von *Anthr. Cat. 2* gehört wahrscheinlich zu diesem Skelette und ist männlich. Den Schädel zu *Anthr. Cat. 1* möchte ich nicht mit derselben Wahrscheinlichkeit als weiblich bezeichnen, und auch nicht mit Sicherheit seine Zugehörigkeit zum Skelette von *Anthr. Cat. 1* behaupten.

Eine Verwechslung der Theile der beiden Skelette unter einander ist ausgeschlossen, wegen der ganz verschiedenen Färbung. Es wäre nur möglich, dass durch den Sammler Theile von anderen Skeletten hinzugekommen sind. Bei der Untersuchung aller oben beschriebenen Knochen schien mir dieses Bedenken jedoch nur in Bezug auf den zweiten Lendenwirbel von *Anthr. Cat. 2* berechtigt (s.o.) Die Zusammengehörigkeit der langen Röhrenknochen ist nicht in Zweifel zu ziehen.

Eine vergleichende Beschreibung der Hand- und Fussknochen kann, trotzdem diese Theile des Skelettes vom anthropologischen Standpunkte besonders wichtig sind, nicht erfolgen, weil hier das nöthige Vergleichsmaterial und ausserdem zur genauen Behandlung dieses schwierigen Kapitels auch die Zeit fehlt. Aus denselben Gründen musste auch in den vorhergehenden Abschnitten bisweilen darauf verzichtet werden, in Einzelheiten einzugehen.

Vielleicht wird es möglich sein, diese Lücken an diesem und anderem osteologischen Material von Buschmännern später an anderem Orte zu ergänzen, unter Heranziehung der Ergebnisse von Untersuchungen und Messungen am Lebenden.<sup>1</sup>

<sup>1</sup> Der Autor bereist im Auftrage der K. Akademie der Wissenschaften in Wien Südafrika zum Studium der Buschmänner.

Herrn Dr. *Gunning*, dem Direktor des Transvaal-Museums, sei an dieser Stelle der Dank für die Überlassung des Materials zur Veröffentlichung ausgesprochen.

Mit einer noch so genauen Untersuchung der Schädel und Skelette kann jedoch die Charakterisirung der Buschmannrasse nicht erschöpft sein. Die starke Beckenneigung, welche am Lebenden so deutlich auffällt, ist aus dem Skelett allein nicht ohne weiteres zu ersehen, die richtige Restaurirung der Wirbelsäule und des Beckens in ihrer ursprünglichen Stellung sind ohne Kenntniss der Weichtheile unmöglich. Viele andere Eigenthümlichkeiten der Rasse sind nur an Weichtheile geknüpft, so die Fettansammlung am Steiss, die Gestalt des Ohres und der Augenlider, die dicken Querfalten der Stirnhaut, die ganz eng gekräuselten, sich stets zu kleinen Knäulen verfilzenden Haare, die von *F. von Luschan* entdeckte, fast horizontale Stellung des Penis, u.a.m.

Je genauer die Rassenmerkmale des Buschmanns bekannt werden, desto zweifelloser wird die Sonderstellung dieser Rasse, die gar nichts zu thun hat mit dem Urtypus eines grossen Theiles der Menschheit, dem Australier, und den mit diesem verwandten noch lebenden primitiven und prähistorischen Menschenrassen.

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**A NEW SPECIES OF HAEMAPHYSALIS FROM EAST AFRICA.**

By C. W. HOWARD, Entomologist for the Province of Mozambique.

*Haemaphysalis africana*, n. sp.

*Male* : Of very small size, 2 mm. long by 1.5 mm. wide, the widest point being at the middle of the length of the shield. Colour light yellowish brown, a little darker in the lateral and posterior portions of the dorsal shield, through which the ramifications of the intestines show as darker lines; the ventral surface is bluish in colour. Dorsal shield convex, covers all of the dorsal surface of the body; narrow in front, widely rounded behind; surface finely roughened over its entire extent, numerous, large, unequal, shallow punctuations scattered over its surface, most numerous in the posterior portions; two large shallow depressions one on each side of the median line near the posterior margin; cervical emargination not very deep; coxae I projecting slightly beyond the sharp cervical angles of the shield; cervical grooves wide, shallow, and short, converging toward the median line; lateral grooves well marked, but not deep, beginning at the anterior edge of coxae III and extending to the division between the ultimate and penultimate festoons; posterior festoons sharply marked, eleven in number, longer than wide, bearing a few large, shallow punctuations and a few small hairs on the posterior margin; no eyes; dorsal porose areas below the middle of the length of the shield. Rostrum with base rectangular, twice as long as wide; on dorsal surface, with posterior angles long and sharp; ventral surface of base as long as wide; palpi with article I very small and hidden, article II with lateral edges protracted in the posterior half into a long, sharp spine somewhat longer than the length of the article itself, this lateral spine is slightly protracted posteriorly on the dorsal surface; article III as wide as long on the dorsal surface, conical in outline; median edge of articles II and III protracted on dorsal surface over the mandibular sheath; ventral surface of article III bears article IV in a large concavity; article IV papilliform bearing on its tip a bunch of about fifteen short, stout spines and several tubercular spines near its base; article II bears nine large pinnate spines on the medio-ventral edge, article III bears four similar spines on the posterior portion of its medio-ventral edge; hypostome of usual type, numerous small denticles at tip followed on each half by a transverse row of three blunt teeth, these succeeded by eight transverse rows of four teeth each, with a final row of two teeth, the teeth extending farthest posteriorly on the lateral edges, all teeth except those at the tip are very sharp and of medium size; mandibles with outer apophyses bearing three teeth, the posterior tooth largest and widely separated from the two anterior teeth, inner apophysis slender, bearing below its tip a large tridentate transverse process. Ventral surface with numerous large, shallow punctuations unevenly distributed; genital pore opposite the anterior edge of coxae II, with an elongate semi-circular thickened portion forming the posterior margin; genital grooves deep, almost parallel until just anterior of the anus, when they curve slightly outward and pass beyond the anus, reaching nearly to the posterior margin opposite the festoon third from the middle; anus at the posterior third of the length of the body, with six large spines on each valve near the circumference; anal groove passes behind and close to the anus, not quite joining the genital grooves on each side in front; ano-marginal groove almost reaching the posterior festoons; no ventral



plates; posterior festoons set off anteriorly by a deep marginal groove reaching on each side to the stigmatic plates, these plates are situated at the level of the anus, and are short, comma-shaped, with the tail extending to the dorsal surface, plates light coloured, with darker rims; coxae I triangular, the remainder quadrilateral in outline, coxae I separated from coxae II, III, and IV by a wide space, the three posterior coxae being contiguous, a wide tooth on the posterior angle of coxae I, a similar sharp tooth on the postero-median angle of coxae IV, a wide blunt tooth on the middle of the posterior margin of coxae II and III, two long, stout hairs on the postero-lateral angle of each coxa. Legs light brown in colour, stout; tarsi abruptly attenuated at tip; pulvillum large, nearly as long as the claws.

*Female* (engorged): Length, 6 mm. by 4.5 mm. wide; sides nearly parallel, widely rounded at both ends. Colour dark chestnut brown when in formalin, bluish when alive, legs and rostrum light brown, dorsal shield same colour as body. Dorsal surface with numerous large, equal, shallow punctures, irregularly distributed, four short anterior grooves, the lateral ones slightly concave toward the median line; three long posterior grooves, the median straight and extending the farthest anteriorly and posteriorly, laterals concave toward the median line; posterior festoons present, but scarcely visible in the engorged specimen; dorsal porose areas at about the middle of the length of the body and close to the median line. Dorsal shield small, dark chestnut brown in colour, widely elliptical in outline, almost as wide as long; cervical emargination shallow; cervical grooves deep, at first converging, then nearly parallel, and extending over two-thirds of the length of the shield; a short median posterior groove; no eyes; punctuations large, unequal, widely separated and irregularly distributed. Rostrum with dorsal surface of base twice as wide as long, posterior angles prominent; ventral surface of base wider than long, but nearly semi-circular in outline; palpi similar to those of the male, except that the lateral projection of article II is wider, making articles II and III together conical; ventral tooth of article III is smaller and narrower than in the male; four pinnate spines on the posterior part of the medio-ventral edge of article III and eight similar spines on the medio-ventral edge of article II instead of three and nine respectively as in male; mandibles with outer apophysis bearing five teeth, two small and equal ones at the tip, and the other three progressively larger from tip to base, inner apophysis with the transverse process large and tridentate; hypostome of usual shape, numerous denticles at the tip, followed on each half by one transverse row of three large teeth, behind which is twelve rows of four large teeth each, rows rather irregular and teeth not so large or sharp as in male. Ventral surface similar to dorsal surface; genital pore small, opposite coxae II; genital grooves shallow, except in the middle of their length, diverging posterior of pore then nearly parallel till they reach the level of the stigmatic plates, where they diverge laterally, reaching almost to the posterior margin opposite the third festoon from the middle; anus slightly below the middle of the length of the body; anal groove scarcely visible in engorged specimen; ano-marginal groove well marked, and reaching the posterior margin; coxae all widely separated, coxae I close to the rostrum, all coxae similar to those of the male; stigmatic plates circular in outline, with the dorso-lateral tail scarcely indicated, colour almost white, with a darker border. Legs similar to those of the male, but comparatively shorter and more slender.

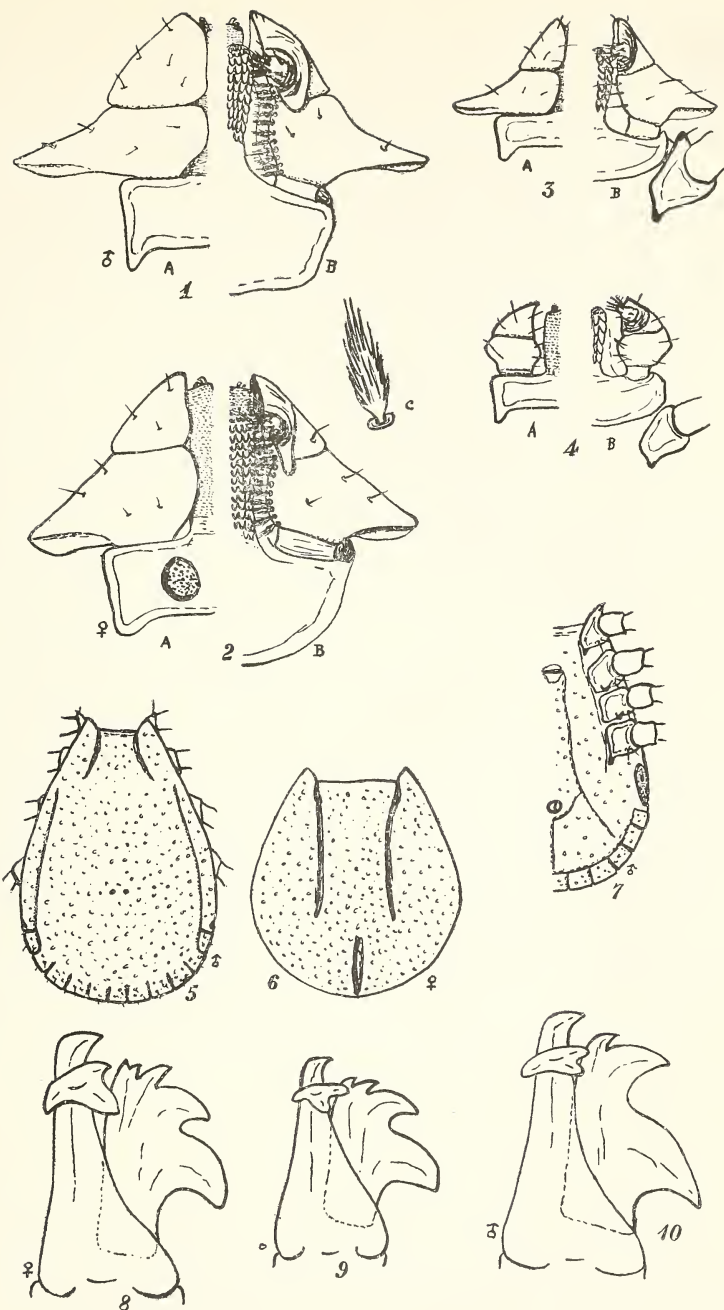


Plate XXXIV.

1. Rostrum of male of *H. africanum*.  
 (a) Dorsal surface.  
 (b) Ventral surface.
2. Rostrum of female of *H. africanum*.  
 (a) Dorsal surface.  
 (b) Ventral surface.  
 (c) Pinnate, spine enlarged.
3. Rostrum of nymph of *H. africanum*.  
 (a) Dorsal surface.  
 (b) Ventral surface.
4. Rostrum of larva of *H. africanum*.  
 (a) Dorsal surface.  
 (b) Ventral surface.
5. Dorsal shield of male of *H. africanum*.
6. Dorsal shield of female of *H. africanum*.
7. One-half of ventral surface of male of *H. africanum*.
8. Mandible of female of *H. africanum*.
9. Mandible of nymph of *H. africanum*.
10. Mandible of male of *H. africanum*.

*Nymph* (engorged): Length 2 mm. by 1 mm. wide; narrowly rounded in front, widely rounded behind. Colour bluish black. Dorsal surface with numerous large irregularly distributed punctuations, some of which bear short whitish hairs; two short anterior dorsal grooves close to median line and slightly concave; three posterior grooves, the median straight and extending from the anterior grooves to the posterior margin; posterior festoons distinctly marked. Dorsal shield light brown in colour, with the posterior portion darker; large; almost circular in outline; cervical emargination shallow and wide; cervical grooves shallow, converging and extending half the length of the shield; surface finely granulated; no eyes; coxae I extend slightly beyond the cervical angles of the shield. Ventral surface similar to the dorsal; genital pore absent; genital grooves begin opposite coxae IV, diverge and reach the postero-lateral margin at about the third festoon from the middle one; anus small, just below the middle of the length of the body; anal groove pointed behind, and reaching the genital grooves on each side in front; ano-marginal groove nearly reaches the posterior margin; stigmatic plates large, whitish, nearly circular in outline, situated at the level of the anus; coxae and legs similar to those of the female, all light brown in colour; an additional pair of stigmatic pores between coxae I and II on the lateral margin of the body. Rostrum light brown in colour; base with dorsal surface twice as wide as long, posterior angles prominent; article I of palpi small; article II wider than long, posterior portion of outer edge prolonged laterally into a sharp tooth; article III as wide as long, conical, median edge prolonged over the mandibular sheath; both articles II and III valvate; article IV small and papilliform and extending ventrally.

*Larva* (engorged): Length 1 mm., width 0.6 mm. Colour bluish, except the legs, shield, and rostrum, which are light brown. Dorsal surface with anterior and posterior grooves similar to those of the nymph; a few short, light-coloured hairs; a marginal groove slightly indicated, extending from the shield to about the festoon second from the median one; caudal festoons well marked. Dorsal shield small, covering hardly one-third of the length of the body, heart-shaped in outline, wider than long, surface reticulated; cervical emargination shallow; cervical grooves deep, concave outward, and extending almost to the postero-lateral margin; no eyes; coxae I project very much beyond the cervical angles of the shield. Ventral surface similar to dorsal; genital grooves widely separated, broken, reaching almost to the posterior margin; anus near the posterior third of the length; anal groove does not join the genital grooves; ano-marginal groove deep, and nearly reaches the posterior margin; coxae well separated, rectangular in outline, each with a small tooth on the posterior margin; three pairs of stigmatic openings, one pair between coxae I and II on the lateral margin of the body, the second pair directly posterior of and close to coxae II, the third pair posterior of coxae III. Legs, three pairs, stout, light brown in colour. Rostrum with base three times as wide as long on the dorsal surface, posterior angles not very prominent; articles II and III of the palpi when taken together are longer than wide, triangular in outline, widest near the middle of article II, but article II is not protracted laterally into such a sharp spine as in the nymphs and article IV in a pit on the ventro-median surface of article III, papilliform with several stout hairs on the tip; hypostome small, spatulate, with five or six rows of two sharp teeth each on each half; mandibles similar to those of the male except that the lower tooth on the outer apophysis is closer to the upper two teeth.

*Hosts* : On the bird known as Burchell's Coucal, *Centropus burchelli*.

*Habitat* : Manhica, Lourenço Marques District, Portuguese East Africa.

The above description was made from four males, one engorged female, three engorged nymphs, and six engorged larvae, taken from a Burchell's Coucal (*Centropus burchelli*), shot at Manhica, in the northern part of the district of Lourenço Marques, Province of Mozambique, on the 3rd of June, 1908. It seems rather remarkable that all four forms, i.e. males, females, nymphs, and larvae should be found on the host at the same time.

So far as we know at present only one other species of *Haemaphysalis* occurs in South Africa. This is *H. leachi*, a common pest of dogs and the transmitter of Piroplasmiasis of the dog. *H. africana* can be easily separated from *H. leachi* by the following characters :—

*H. leachi*.—

1. Male with body elongate and slender.
2. A large tooth projecting posteriorly on both dorsal and ventral sides of the lateral prolongation of article II of the palpi, in male, female, and nymph.
3. Females large and more or less ovoid in outline ; dorsal shield oval in outline.

4. Shield of nymph pentagonal.

5. Larva with palpi similar to those of the adults, bearing the prominent lateral prolongation of article II.

*H. africana*.—

1. Male smaller, lighter coloured, and not so elongate and slender, punctuations on the dorsal shield larger and fewer in number.

2. No ventral posteriorly projecting tooth on article II of the palpi, and the dorsal tooth largely reduced. The same fact is true in the nymph.

3. Females small and quadrilateral in outline ; the dorsal shield is nearly circular in outline.

4. Shield of nymph nearly circular in outline.

5. In the larva the palpi do not have such a prominent lateral prolongation ; this prolongation is shorter and wider, making the palpi appear short spindle shaped.

The type specimens are in my private collection.



## A FEEDING HABIT OF SOME LOURENCO MARQUES BUTTERFLIES.

By C. W. HOWARD, Chief, Entomological Division, Department of Agriculture for the Province de Moçambique.

DURING the month of April last my attention was called to the loss of the crop of apples on a few trees near Lourenco Marques. On investigation I found that not only the apples, but also some quinces near by, were rendered entirely unfit for use owing to the depredations of a small butterfly, *Crenis boisduvali* (Wallengren). The trees were growing in a low valley surrounded by and close to a considerable bush, exactly the situation which they prefer, and the apple trees were literally covered with butterflies. So intent were they upon their work that it was very easy to watch them force their probosces through the skin of the apple, suck up the juice, withdraw the proboscis partway, and insert it at a new angle. This process was repeated until a large area was exhausted of juice. On cutting open the apple or quince nothing but fibres were found in the area beneath the puncture. Exteriorly only a small puncture could be seen on what was apparently a perfectly sound fruit. Soon, however, discoloration commenced and decay began to set in, which spread rapidly, causing the apple to drop to the ground. When the butterflies began to attack the apples they were approaching the ripening stage, but were still hard and firm. The quinces were very hard and still green. After the fruit had fallen the butterflies continued their feast upon the decaying mass.

About a month later my attention was called to another case of fruit being destroyed by butterflies. This time it was oranges and naartjes which were attacked by butterflies of the species *Charaxes neanthes* (Hewitson) and *Charaxes zoölina* (Westwood). In this case the oranges were still green, only a few beginning to turn yellow, and were of a very thick skinned variety. For some time only the punctures appeared on the exterior of the oranges, but after a few days a circular area about them became yellow and finally decay set in, and eventually the oranges dropped from the trees. A section through the part punctured showed a mass of fibres with all the juice extracted. Hundreds of butterflies were present; indeed, they were so numerous that often seven or eight were clinging to each orange, and the ground beneath the trees was thickly strewn with decaying oranges.

A search through the scanty literature at my disposal reveals very few notes on the feeding habits of these three butterflies. As regards *Crenis boisduvali*, I find no records of food habits, but as regards the *Charaxes* I find a note by Trimen in "South African Butterflies," vol. 1, p. 315, to the effect that they are fond of the sap which exudes from the wounds in trees, the moisture in damp earth, droppings of animals, and even decomposing carcasses. On page 320 he also states that *C. zoölina* frequents the flowers of a yellow-flowered thistle in Kaffraria. Mr. Swierstra, of the Transvaal Museum, to whom I am indebted for identifying specimens forwarded to him,

informs me that these butterflies will feed on decaying fruit as well as decaying animal matter. This fact I also noticed when examining the oranges. The peculiar thing seems to be that a butterfly will enjoy the sharp, acid juice of an unripe orange or lemon, yet it can be a no more erratic taste than that for the juice from a decaying carcass.

Entomological writings mention three other Lepidoptera in South Africa which have a similar habit of puncturing fruit, but curiously enough these are all moths. In the Transvaal a few years ago rather a serious epidemic occurred of *Ophiusa catella*, which brought ruin to the crops of peaches, plums, and grapes in many districts. In Cape Colony *Sphingomorpha chlorea* and *Ophiusa lienardi* have a similar habit. These moths attack the fruit at night or on cloudy days, while the butterflies work only on the brightest days. Furthermore, the moths are very stout bodied and possess strong, sharp probosces, quite capable of puncturing even a hard, green fruit.

These three examples will serve to throw discredit upon our old theory that the Lepidoptera are, as a rule, destructive only in the larval stage.

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## A NOTE ON THE COPULATION OF TICKS.

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BY C. W. HOWARD, Chief, Entomological Division, Department of Agriculture for the Province de Moçambique.

DURING the past summer, while stopping at Mopea Sugar Estate on the Zambesi River, I spent a half day collecting in the forest, along a road frequented by cattle from the estate. Among other specimens collected was an unengorged female *Rhipicephalus* clinging to a leaf of a thorn tree (*Acacia* sp.) Apparently I had only one tick, but when I began to look more closely I found a mature male clinging firmly to the underside of the female, in copulation.

Upon examining these ticks more carefully I found that they were specimens of *Rhipicephalus ecinctus* Neumann.

Very few observations have been made upon the copulation of *Rhipicephalus*. Hooker (1908) states that the brown dog tick of America (*Rhipicephalus texanus*) moults upon the host, and as soon as the male is free from the nymphal skin he goes in search of the female and remains clinging to her until she drops from the host fully engorged. Lounsbury records that the brown tick of South Africa, *Rhipicephalus appendiculatus*, copulates on the host after a short feed; the female engorging to repletion, however, only after copulation.

These references seem to indicate that the species of *Rhipicephalus* copulate only on the host during the period of parasitism, and I am unable to find any reference in literature to any species of *Rhipicephalus* copulating before the period of parasitism. My observation on *Rhipicephalus ecinctus*, then, becomes of special interest.

## DESCRIPTION OF THE MALE OF POLYPTYCHUS NUMOSAE (WLLGR.)

By C. J. SWIERSTRA, First Assistant.

Plate XXXV, figure 2.

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WHEN Mr. A. J. T. Janse first showed me the single male specimen in his collection I took it to be a new species, but when comparing the specimen with the description of the female of *P. numosae* (Wllgr.) it turned out to be the male of that species. As the male seems to be undescribed and the figure of the female in Distant's *Insecta Transvaaliensia*, described as *P. consanguineous* Dist., seems to be a very poor reproduction of the female, I thought it not superfluous to describe and figure this male. The reproduction is almost perfect, although the linear markings of the forewing are a little too prominent, as are also the linear markings on the underside of both wings.

Body and legs greyish fawn coloured ; head and thorax with a central longitudinal chestnut stripe.

Forewing : Greyish fawn coloured, paler towards the outer margin, two black dots near base, with three indistinct, almost straight, lines just beyond them, of which the first crosses base of cell and the other two, near together, cross about middle of cell. A fairly regular dentated brownish black line across the middle of the wing, beyond this line three indistinct dentated striae which are about equi-distant. The whole wing is covered with chestnut brown speckles.

Hindwing : Brick-red, darker at base, lighter towards outer margin. A dark chestnut spot at anal angle. Above this spot and parallel with outer margin is a streak, just above and a little beyond the anal spots, where it is broad and of a dark chestnut colour ; when past these spots it abruptly narrows and is only a little darker than ground colour. The area between this streak and outer margin is greyish, sparsely speckled with light chestnut.

Underside : Forewing, basal half reddish, outer half lighter, turning to greyish towards hind margin, covered with brownish speckles. Three curved reddish brown indistinct striae ; the first above middle, the second, which is almost obsolete, nearer to third, which is slightly dentate (not brought out in figure).

Hindwing : Greyish-pink with the entire wing covered with chestnut speckles. Two curved brownish striae crossing wing, of which the first, just before middle, is more distinct than the second, which is nearer hind margin. Space between the two striae darker than the rest of the wing. At anal, on either side of the second striae, are two short striae of the same colour as the others. The upper one of these two short striae indistinct.

Cilia : Brownish, white at the tips between the veins.

*Habitat* : One male from Warmberg, 7th January, 1904. (A. J. T. Janse).



Fig 1.

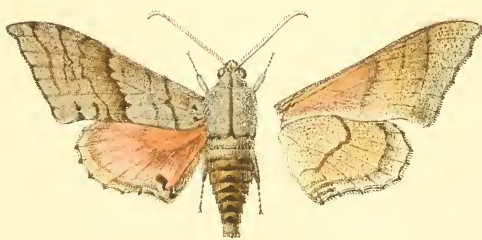


Fig. 2.

Plate XXXV.

Fig. 1.—*Leptoneura jansei* Swierstra.  
Fig. 2.—*Polyptychus numosae* (Wlgr.)

*Janse del. et nat.*





## A REVISION OF THE SOUTH AFRICAN SPECIES OF *CISTICOLA* (GRASS WARBLERS).

BY A. K. HAAGNER, F.Z.S., Assistant, Transvaal Museum.

IN attempting to determine the specimens of *Cisticola* in the Transvaal Museum, I was soon confronted with the difficulties attending the proper identification of the members of this none too easy group. As the series of many of the South African species are very long, I endeavoured to work the group out as best I could, and to try and reduce the existing chaos to something like order. When I had completed the separation of the species I forwarded the whole collection with my notes to Dr. Reichenow, requesting him to be good enough to compare our series with his own, and to revise and check my conclusions. With very few exceptions, Dr. Reichenow has agreed with me, and I wish to take this opportunity of expressing my great indebtedness to him for his ever-ready help and sympathetic interest.

The close relationship of many of the species of *Cisticola* renders a large series necessary for the correct identification of several of the species. As much confusion has hitherto existed amongst these said species, we think a full list of specimens with localities and dates will be useful.

A key of the South African species follows :—

1. Upper surface plainly, though sometimes obscurely, streaked. 2.  
Upper surface plain (unstreaked). 10.
2. Under surface pale brown-grey; back grey; tarsus under 21 mm.  
*C. subruficapilla*.  
Under surface washed with rusty yellow, yellowish or dusky-grey. 3.
3. Tarsus 25 mm. or over. 4.  
Tarsus under 25 mm. 5.
4. Entire upper surface yellow or tawny brown, thickly streaked with dark brown .. .. . *C. natalensis*.  
Entire upper surface grey-brown, thickly streaked with dark brown .. .. . *C. strangei*.
5. Rump yellowish or rusty-rufous; head not more rufous than back. 6.  
Rump not yellowish or rufous; head rufous. 7.  
Rump not more yellowish or rufous than back, head not, or only slightly more rufous than back. 9.
6. Back broadly streaked with dark brown; sides of breast streaked  
*C. terrestris*.  
Back paler, streaked with dark brown; sides of breast unstreaked  
*C. lavendulae*.  
Back paler, streaked with dark brown; sides of breast unstreaked, rump rusty yellow .. .. . *C.e. uropygialis*.
7. Tarsus under 20 mm. 8.  
Tarsus over 21. Feathers of back black, edged with grey  
*C. lugubris*.
8. Back tawny-brown, streaked with dark brown; head unstreaked or only slightly streaked .. .. . *C. mülleri*.  
Back black, feathers edged with grey, head plainly and broadly streaked .. .. . *C. thinniens*.

9. Upper surface tawny-yellow, streaked black or dark brown ; upper tail-coverts unstreaked . . . . . *C. chiniana*.  
Upper surface tawny-yellow, streaked black or dark brown, upper tail-coverts streaked . . . . . *C. magna*.
10. Underside grey and white, or greyish and tawny-white mixed. 11  
Underside whitish, tawny, or dusky yellowish. 13.
11. Underside deep grey, centre of abdomen white . . *C. fulvicapilla*.  
Underside tawny white or yellowish ; flanks and sides of breast greyish, or washed with grey. 12.
12. Tail over 55 mm., longer than wing . . . . . *C. ruficapilla*.  
Tail under 55 mm., not longer than wing . . *C. cinnamomeiceps*.
13. Head rufous, defined from coloration of back. 14.  
Head either coloured like the back, or greyer or yellower. 15.
14. Back dark earth brown . . . . . *C. pretoriae*.  
Back grey brown . . . . . *C. semitorques*.
15. Wing over 54 . . . . . *C. sylvia*.  
Wing under 54. 16.
16. Cheeks and forehead yellowish, wing 52 . . . . *C. erythrops*.  
Cheeks and forehead only slightly paler than crown, wing 44  
*C. rufa*.

(1) *Cisticola subruficapilla* (A. Sm.)

Following series examined :—

- 11 Specimens from Knysna, C.C. (Marais).
- 1 Specimen „ Uitenhage, C.C. (R. H. Ivy).
- 1 „ „ Grahamstown, C.C. (R. H. Ivy).
- 1 „ „ Pienaars River, Transvaal (F. V. Kirby).
- 2 Specimens „ Woodbush, Zoutpansberg, Transvaal  
(F. V. Kirby).
- 1 Specimen „ Pretoria, Transvaal (A. Roberts).
- 1 „ „ Dargle, Natal (A. Roberts).
- 2 Specimens „ Bulawayo (*ex* Rhodesia Museum).

*C. subruficapilla* differs from *chiniana* in its smaller bill, shorter and more slender tarsus and toes (nails) ; is altogether a good bit smaller. Typical examples have the crown red-brown, the back grey, while in *chiniana* the difference in the coloration of head and back is not very pronounced.

The bird from Uitenhage, the one from Natal, and seven of the Knysna birds are obviously juvenile. The two former have the crown only slightly ruddier than the back, while three of the Knysna birds have this region considerably redder, but not so rufous as in typical adults, the remaining four having the crown of the same grey ground colour as the back. Most of the Knysna juveniles have the chest streaked with dark brown.

(2) *Cisticola mülleri* Alex.

Three specimens examined.

- 1 Transvaal (?).
- 1 Modderfontein, Transvaal (Haagner).
- 1 Matoppos (R. Williams).

These birds are referred to this species with some doubt, as the ground colour of the back is inclined to russet-brown, only the bases of the feathers and some of the inner webs being grey. In the plain chestnut-brown centre tail feathers, it agrees with Alexander's description of *mülleri*.

(3) *Cisticola strangei* (Fraser).

- 5 Pondoland (H. H. Swinney).
- 1 Beira, P.E. Africa (P. A. Sheppard).
- 1 Boror, P.E. Africa (Kirby and Roberts).

Differs from *chiniana* and *subruficapilla* in the crown and back, being of the same grey-brown tint, and from the latter also by its larger size.

All the examples above mentioned have a feint, but unmistakable, pale rusty collar on the nape.

This well-marked species has evidently been entirely overlooked by Dr. Stark and Mr. W. L. Slater.

(4) *Cisticola chiniana* (A. Sm.)

- 6 Bulawayo (ex. Rhodesia Museum).
- 1 Modderfontein, Transvaal (A. Haagner).
- 1 Pienaars River, Pretoria District (F. V. Kirby).
- 1 Brits, Rustenburg District (F. V. Kirby).
- 1 Barberton (A. J. Dreyer).
- 2 Klein Letaba, Transvaal (Marais).
- 1 Pretoria (A. Roberts).
- 1 N.W. Rhodesia (C. Wilde).

The distinguishing characters of this species are given in the previous species. It differs primarily from the next in the unstreaked upper tail-coverts. As the types of Smith's *chiniana* came from Kurrichaine, the northern form must bear this name.

(5) *Cisticola magna* Gould.

- 3 Specimens from Pondoland (Davies).
- 4 Specimens from Grahamstown (Ivy).

The southern representative of *chiniana* is less thickly streaked than the northern (typical) form, is not so brightly yellow beneath, and has the upper tail-coverts streaked.

This bird ranges as far north as North-East Africa. As this bird agrees very closely with Gould's description and figure of *Cisticola magna* it must bear this name in future. It has hitherto been confused with *natalensis* and *chiniana*.

(6) *Cisticola natalensis* (A. Sm.)

- 4 Umamvuna River, E. Pondoland (Davies).
- 3 Ngqeleni, W. Pondoland (H. H. Swinney).
- 1 Matopos, Rhodesia (Rhodesia Museum).
- 1 Beira, P.S.E. Africa (P. A. Sheppard).
- 1 Boror, Mozambique (Kirby and Roberts).

This species is easily recognisable by its large size and tawny yellow colouring, the entire upper surface being of the same ground colour, broadly streaked with dark brown. Underside white; sides of body and flanks pale tawny yellow.

(7) *Cisticola tinniens* (Leht.)

- A long series in the Transvaal Museum.
- 5 Knysna, C.C. (v. O. Marais).
- 7 Ngqeleni, W. Pondoland (H. H. Swinney).
- 1 Lusikisi, E. Pondoland (C. Davies).
- 1 Honingspruit Station, Orange River Colony (D. Gunn).
- 1 Port Elizabeth, C.C. (?).
- 1 Grahamstown (Albany Museum).
- 5 Woodbush, Zoutpansberg (F. V. Kirby).



- 2 Pretoria, Transvaal (A. Roberts).
- 2 Belfast, Transvaal (A. Roberts).
- 2 Potchefstroom, Transvaal (A. Roberts).
- 2 Dargle, Natal (A. Roberts).

One of the Natal birds is a puzzle. It was collected on the 20th March, 1908, and is obviously a juvenile bird. It has, however, longer tarsi than the average *tinniens*, and has the rump and upper tail-coverts rusty-yellow. If *erythrogenis* was found in South Africa we would refer it unhesitatingly to that species.

(8) *Cisticola lugubris* Rüpp.

- 1 Beira, P.E. Africa (P. A. Sheppard).
- 4 N.W. Rhodesia (C. Wilde).

Easily recognisable from *tinniens* by its much larger size and paler rump.

(9) *Cisticola uropygialis* (Fraser).

- 2 Examples from Zoutpansberg, Transvaal (Marais).
- 1 Example, Matopos (Rhodesia Museum).

Mainly differing from *C. terrestris* and *C. lavendulae* by the tail feathers having a marked subterminal black bar before the white tip.

(10) *Cisticola terrestris* (A. Sm.)

- 3 Zoutpansberg, Transvaal (Marais).
- 2 Pretoria, Transvaal (A. Roberts).
- 1 Belfast, Transvaal (A. Roberts).
- 2 Honingspruit, O.R.C. (D. Gunn).
- 1 Grahamstown, C.C. (R. H. Ivy).

Differs from *uropygialis* in the coloration of the tail feathers being dark brown with a white tip (no distinct subterminal black bar); slightly larger size, and paler edges to feathers of upper parts, and from *lavendulae* in its shorter tail. (30 mm.)

(11) *Cisticola lavendulae* Grant & Reid.

- 1 Example, Waterfall, Zoutpansberg (Marais).
- 1 Example, Sand River, Pietersburg (F. V. Kirby).

Differs from *terrestris* in its longer tail (40 mm.) and much paler rump; also general tone of upper surface paler.

(12) *Cisticola pretoriae* Nov sp.

Similar to *rufopiliata*, but underside much darker.

The Museum contains three examples collected at Pretoria by Mr. Austin Roberts; and the Rhodesian Museum one from Bulawayo, collected by Mr. F. P. Mennell.

Description: Above dark earth brown, crown dark rufous-brown; tail feathers with a subterminal black bar and paler tips. This bar is very feint in freshly moulted examples, the centre rectrices of which are generally unicoloured. Remiges edged with rusty brown on outer web, and isabel-line on the inner. Chin and throat white. Centre of breast, abdomen, and under tail-coverts tawny-yellow, sides of breast, body and flanks dark smokey grey.

Length in flesh 150 mm. (5.9 inches A.R.), wing 58-59, tail 68-69; tarsus 23; bill 12<sup>5</sup>, —13 mm.

Type: Male, Pretoria, 16th December, 1908. (Iris red-brown; bill dark, gonys horn colour; tarsus flesh colour; claws brown A.R.)

(13) *Cisticola sylvia* Rehw.

- 1 Male, Machili River, N.W. Rhodesia (C. Wilde).
- 1 Sex incert, Boror, P.E. Africa (Kirby & Roberts).

Upper surface drab-brown with a tinge of fawn, top of head only slightly rustier than back. Under surface whitish; sides of head, neck, body, and flanks pale tawny-yellow. Tail feathers very broad (approaching *Bradypterus*) with a broad pale edge after the subterminal black bar.

Central tail feathers unicoloured. Length, 140 mm.

The specimen from Boror is a young bird, as evidenced by the washes of yellow on both upper and under surface. (Iris light vandyke-brown, bill brown above, horn below; gape yellow; tarsus flesh colour. L. 144. W. 58. C. 13. Kirby & Roberts.)

(14) *Cisticola semitorques* (Heugl.)

[*C. cinerascens*, Stark & Sclater.]

Resembles *pretoriae*, but paler everywhere, also smaller, the bill being also more slender. Back greyer.

The Transvaal Museum possesses only two examples of this species, one from Natal, collected by A. Roberts, and one from Melsetter, Rhodesia (Swynnerton).

(15) *Cisticola ruficapilla* (Vieill.) [*C. aberrans* (Smith)].

4 Grahamstown, C.C. (Ivy).

7 Pondoland (H. H. Swinney).

1 Woodbush, Transvaal (F. V. Kirby).

1 Boror, P.E. Africa (Kirby & Roberts).

1 Karri River, Bulawayo (Rhodesia Museum).

From this series it is impossible to separate *ruficapilla* from *aberrans*, and the two must henceforth be united.

Distinguished from *cinnamomeiceps* Haagner by its much larger size and longer tail, and from *fulvicapilla*, in addition, by its whitish under parts.

(16) *Cisticola cinnamomeiceps* Haagner.

(Annals, Transvaal Museum, January, 1909.)

Type from Beira, P.E. Africa (P. A. Sheppard).

Co-type from Matabeleland (C. Wilde).

5 Skins, Pretoria, Transvaal (A. Roberts).

1 Potchefstroom, Transvaal (A. Roberts).

1 Irene (Shortridge).

1 Bulawayo (Rhodesia Museum).

1 Shangani River (Rhodesia Museum).

1 Boror, P.E. Africa (Kirby & Roberts).

This bird has hitherto been confused with *fulvicapilla* and possibly with *aberrans*. It is the northern representative of *fulvicapilla*, from which it mainly differs in its pale under parts, *only the sides of breast and body* being washed with grey, and the upper breast greyish in some specimens. It has moreover a faint subterminal dark brown bar on the tail not possessed by either *fulvicapilla* or *ruficapilla*. From the latter bird it is in addition distinguished by its smaller size and shorter tail.

(17) *Cisticola fulvicapilla* (V).

5 Grahamstown (Ivy).

2 Knysna (Marais).

1 E. Pondoland (Davies).

8 W. Pondoland (Swinney).

This is a distinct and easily recognised form; the throat, entire breast, sides, and flanks being of a deep (slate) grey, only centre of abdomen and chin being white; under tail-coverts tinged with grey. This is the true (southern) *fulvicapilla*, the description of which in "Vögel Afrikas," p. 565, is somewhat misleading.

(18) *Cisticola rufa* (Fraser).

1 Skin from Beira (P. A. Sheppard).

Distinguished by its unicoloured pale brown (sometimes tawny) upper surface, and small size. A dark subterminal bar on tail.

(19) *Cisticola erythrops* (Hartl.)

2 from Boror, P.E. Africa (Kirby & Roberts).

Distinguished from *rufa* by its larger size, darker upper surface, and rustier flanks.

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## DESCRIPTIONS OF TWO NEW SPECIES OF BIRDS FROM THE BOROR DISTRICT OF PORTUGUESE EAST AFRICA.

BY ALWIN HAAGNER, Assistant, Transvaal Museum.

IN December, 1908, the Transvaal Museum acquired a fine collection of about 400 birds, collected by Messrs. F. Vaughan-Kirby, F.Z.S., and Austin Roberts in the Boror District of Portuguese East Africa. A full account of the collection will appear later, either in the "Annals" or in the journal of the S.A.O.U. The Boror district is that portion of Mozambique Territory lying just north of the Zambesi River. The collection was made in a comparatively restricted area, the party never having been further north than the 17th degree of south latitude, nor further west than the 36th degree.

Amongst this collection there are several new to science. My thanks are due to Dr. Reichenow for kind assistance in verifying and comparing birds for me.

### *Anthoscopus robertsi*, sp. nov.

Above pale grey-brown, with a distinct yellow-olivaceous tinge. Forehead, eyebrow, and cheeks pale cream; the latter washed with ashy. Throat and upper breast creamy-white passing into cream colour on the lower breast and sides of the body. Abdomen and flanks pale rufous-brown. Thighs pale yellowish. Upper tail coverts slightly washed with pale ochreous-brown. Wing-coverts grey-brown, edged with pale sandy-grey. Remiges ashy-brown edged with creamy-white on the outer web, and with very pale isabelline on the inner. Axillaries and under wing-coverts silky-white.

Measurements of skins : (a) Female (type). L. 78. Wing 53.4. Tail 29.5. Tarsus 13. Culmen 8.8.

(Iris brown. Bill bluish-slate, dark-brown on the culmen and genys. Tarsus pale cobalt-blue. L. 77. W. 52. C. 9. K. & R.) Boror (Villa Pereira), 17th May, 1908.

(b) Female (co-type). Length 78. Wing 50. Tail 26.5. Tarsus 12.5. Culmen 8.6. (Iris pale slate. Bill slate, tomia whitish. Tarsus slate. L. 75. W. 48. C. 8. K. & R.) Villa Pereira, Boror, Port. S.E. Africa, 5th May, 1908.

The second example has the wing-plumage in a somewhat worn condition, hence the smaller measurement.

This new species comes nearest to *A. caroli* Sharpe, but differs markedly from this species in the clear olivaceous grey upper surface, and white under wing-coverts.

### *Helicolais kirbyi*, sp. nov.

Similar to *H. erythroptera* (Jard.), from which it is chiefly distinguished by its isabelline-brown upper surface, instead of grey-brown, and by its smaller size.



Above pale isabelline-brown, crown washed with grey. Upper tail-coverts pale rusty brown. Wing-coverts chestnut or red-brown. Remiges dark-brown, edged with red-brown on the outer and pale isabelline on the inner web. Lores and sides of head pale grey—a dusky spot in front of the eye. Chin and throat white, as is also the centre of the abdomen. Breast washed with very pale rusty yellow, stronger on the sides, shading into rusty-brown on the flanks. Tail feathers edged with rusty-yellow, and with a subterminal black bar before the white tip. (This is distinctly visible from above, and markedly different from the figure of *erythroptera* in the "Ibis," 1869, Plate I, fig. 2.)

(a) Male (type). Length of skin 134 mm. Wing 50.5. Tail 59. Tarsus 21. Culmen 13. Mpimba, Boror, P.E. Africa, 14th July, 1908. (Bill dark brown, gape and genys whitish. Iris brownish-yellow. Tarsus pale-yellow. Length 137. W. 51. Culmen 13. K. & R.)

(b) Female (type). Wing 49. Tail 58. Tarsus 20. Culmen (shot away). Villa Pereira, Boror, P.E. Africa, 24th June, 1908. (Bill brown above, flesh colour below. Iris brownish yellow. Tarsus pale yellow. L. 132. W. 49. K. & R.)

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## CHECK LIST OF THE LEPIDOPTERA-RHOPALOCERA OF THE TRANSVAAL, WITH NOTES ON SOME OF THE SPECIES.

BY C. J. SWIERSTRA, First Assistant.

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THE first record of Lepidoptera-Rhopalocera from the Transvaal dates back from 1875, when H. D. Wallengren published his "Insecta Transvaaliensia" in the Öfversigt of Kongl. Vetenskaps-Academiens Förhandlingar, pp. 83-137, 1875, based on a collection made by N. Persson. After that, Trimen, in his work on South African Lepidoptera-Rhopalocera, recorded and described many species from this Colony. Still later W. L. Distant published in his "Naturalist in the Transvaal," 1892, a list of his captures, recording 73 species and varieties. In 1898, after having spent another three years in the Transvaal, Mr. Distant published a list, "Ann. Mag. Nat. Hist." (7), 1, p. 47 (1898), in which he was able to record 238 species. In that same year Aurivillius published his work "Rhopalocera Aethiopica," in which several species are recorded from the Transvaal, but excluding the Hesperidae.

In the present list the number of species and varieties occurring in this Colony has reached 316, showing an increase above the highest total, 239, that of W. L. Distant, of not less than 78 species.

Mr. Distant's remarks, made some eleven years ago, "Ann. Mag. Nat. Hist." (7), 1, p. 48, "that this list will doubtless be increased when the warm and unhealthy north-eastern regions of the State have been visited by a good collector," applies equally well to the present circumstances. When one takes into consideration that most of the species lately described from the Transvaal are from localities in the eastern part and also from the so-called "bushveld," which are hitherto visited by an occasional collector only, one can quite understand that we expect still further interesting discoveries when these parts will be thoroughly explored.

In the so-called "low country" and part of the bushveld of the Transvaal our butterfly fauna is most abundant, and among the woods which border our rivers, or up the creeks in the different mountain ranges of the east and north-east occur our sub-tropical species, for instance, the fine *Papilio ophidicephalus*, *Charaxes brutus* and many more. That part of the Transvaal has a Lepidoptera fauna quite different from that of the "high veld," which shows that our fauna can really be divided into two distinct regions, the bushveld or middle veld linking these two together. The high veld is of a uniform altitude, between 5,000 and 6,000 feet; its vast, almost unbroken, grassy plains gives one at once the idea of a poor field for a Lepidopterologist; but when once past this plain, coming down into the low country, along the banks of the many rivers and creeks, gay with the colour of the many different species of butterflies, conditions have completely altered, and although our low country cannot compare in richness of Lepidoptera life with Durban or Lourenco Marques, it is there that our Lepidoptera fauna has reached its highest development.

The nomenclature followed in this list is that of Aurivillius, with a few exceptions; Aurivillius, for instance, uses the older name *Cupido* for the genus *Lycaena*, but I have followed Trimen in retaining the name *Lycaena*, which, having been used for a considerable time, has earned for itself a kind of "burger right" in entomological nomenclature; *Phasis* is used by Aurivillius for the well-known genus *Zeritis*, and I would have followed him in this instance but for a note I received from Mr. Feltham, who writes, "I am informed from the Cape Museum that *Phasis* is already preoccupied in another class or order," which of course settles the matter.

The only references given with regard to Synonymy are the original descriptions and references to Trimen's "South African Butterflies," Aurivillius, "Rhop. Aethiopica," and Holland's list of African Hesperidae; and here and there reference is made to other publications when a good figure of the species is published therein. For a full Synonymy I refer students to the abovementioned works, and also, for the Hesperidae, to Holland's Revision and Synonymic Catalogue of the Hesperidae of Africa, etc., published in the Proceedings of the Zoological Society of London for 1896.

My first idea was to publish a list entirely based on material contained in the Museum; but as this would only give an incomplete idea of our fauna, I asked different correspondents to supply me with lists of their captures. Several of them have complied with my request, for which I thank them most sincerely. The names of these correspondents are always placed behind the records they furnished, and for which, of course, they are solely responsible.

There are still a few species not represented in the collection of the Transvaal Museum; these are marked with an asterisk.

## ORDER LEPIDOPTERA.

### SUB-ORDER LEPIDOPTERA-RHOPALOCERA.

#### FAMILY I DANAIDIDAE.

##### GENUS DANAIDA, LATREILLE.

Hist. Nat. Crust. Ins., 14, p. 108 (1805); Aurivillius, Rhop. Aeth., p. 31 (1898).

Danais Trimen, S. Afr. Buttl., 1, p. 50 (1887).

##### 1. *Danaida chrysippus* (Linnaeus).

Auriv., Rhop. Aeth., p. 32 (1898).

*Papilio chrysippus* Linn., Syst. Nat. ed., 10, p. 471 (1758).

Danais chrysippus Trimen, S. Afr. Buttl., 1, p. 51 (1887).

Common throughout the year.

##### 2. *Danaida chrysippus alcippus* (Cramer).

*Papilio alcippus* Cram., Pap. Exot., 2, p. 45, pl. 127, ff. E. F. (1777).

Danais chrysippus var. A (alcippus, Cram.) Trimen, S. Afr. Buttl., 1, p. 53 (1887).

*Danaida chrysippus* var. et ab. *alcippus* Aur., Rhop. Aeth., p. 32 (1898).

Pretoria, January (Dr. H. G. Breyer), March (C. J. Swierstra); Waterberg District, January (R. v. Jutrzencha), in Mus. Coll.; Johannesburg, January (A. Oehse); White River, January, December (A. T. Cooke).

### 3. *Danaida chrysippus dorippus* (Klug).

*Euploea dorippus* Klug, Symb. Phys., pl. 48 ff 1-5 (1845).

*Danais chrysippus* var. B (*dorippus* (Klug) Trimen, S. Afr. Buttl., 1, p. 53 (1887).

*Danaida dorippus* Aur., Rhop. Aeth., p. 32 (1898).

Irene, Pretoria District, February (C. J. Swierstra), in Mus. Coll.; Witpoortjekloof, near Krugersdorp (H. L. L. Feltham).

## GENUS AMAURIS, HÜBNER.

Verz. Bek. Schmett., p. 14 (1816); Trimen, S. Afr. Buttl., p. 56 (1887); Aurivillius, Rhop. Aeth., p. 34 (1898).

### 4. *Amauris niavius dominicanus* Trimen.

*A. dominicanus* Trimen, Trans. Ent. Soc. Lond., p. 323 (1879); S. Afr. Buttl., 1, p. 61 (1887).

*A. niavius* var. *dominicanus* Auriv., Rhop. Aeth., p. 37 (1898).

Barberton, January (Gould); id., April (Miss De Beer), in Mus. Coll.

### \* 5. *Amauris ochlea* (Boisduval).

*Euploea ochlea* Bsd., App. Voy. de Del. dans l'Afr. Austr., p. 589 (1847).

*Amauris ochlea* Trimen, Rhop. Afr. Austr., 1, p. 85 (1862), and 2, pl. 2, f. 6 (1866); S. Afr. Buttl., 1, p. 60 (1887); Aurivillius, Rhop. Aeth., p. 38 (1898).

Recorded by Butler, Proc. Zool. Soc., London, p. 50 (1889), from the Eastern Transvaal.

### 6. *Amauris echeria* (Stoll).

Trim., S. Afr. Buttl., 1, p. 57 (1887); Aurivillius, Rhop. Aeth., p. 39 (1898).

*Papilio echeria* Stoll, Suppl. Cram. Pap. Exot., p. 135, pl. 29, fig. 2, 2b (1791).

*Danais echeria* Trim., Trans. Linn. Soc. Lond., 26, pl. 42, f. 38 (1869).

Barberton, March (Miss De Beer); Waterval Onder, December (A. Ross); Lydenburg District (P. A. Krantz), in Mus. Coll.; common in the Barberton District (G. W. Jeffery).



7. *Amauris echeria albimaculata* Butler.

Ann Mag. Nat. Hist. (4) 16, p. 394 (1875); Trim. S. Afr. Buttl., 1, p. 58 (1887); Aurivillius, Rhop. Aeth., p. 40 (1898).

*Danaüs echeria* var. A. Trimen, Trans. Linn. Soc. Lond., 26, pl. 42, fig. 7 (1869).

Barberton, December (Gould); id., March (Miss De Beer), in Mus. Coll.; White River Sett. (H. L. L. Feltham).

## FAMILY SATYRIDAE. TRIBUS SATYRINA.

GENUS MELANITIS, *FABRICIUS*.

Illigers' Mag., 6, p. 282 (1807); Trimen, S. Afr. Buttl., 1, p. 3 (1887); Aurivillius, Rhop. Aeth., p. 45 (1898).

8. *Melanitis leda* (Linnaeus).

Trim., S. Afr. Buttl., 1, p. 112 (1887); Aurivillius, Rhop. Aeth., 1898, p. 45.

*Papilio leda* Linn, Syst. Nat., ed. 10, p. 474 (1758).

Malalane, February (Gould), in Mus. Coll.; Fountain Valley, Pretoria (H. L. L. Feltham); Pretoria, August, September (W. L. Distant).

9. *Melanitis leda ismene* (Cramer).

*Papilio ismene* Cram., Pap. Exot. 1, pl. 26, ff. a. b. (1775).

*Melanitis leda* L., part. Trimen, S. Afr. Buttl., 1, p. 112 (1887).

*Melanitis leda* var. Temp.(?) et ab. *ismene* Cr., Auriv., Rhop. Aeth., 1898, p. 45.

Lydenburg District (P. A. Krantz), Pretoria (Miss J. Gunning), in Mus. Coll.

GENUS GNOPHODES, *WESTWOOD*.

Gen. D. Lep., 2, p. 363 (1851); Trimen, Rhop. Afr. Austr., 2, p. 189 (1866); Aurivillius, Rhop. Aeth., 1898, p. 46.

*Melanitis*, part. Trimen, S. Afr. Buttl., 1, p. 3 (1887).

\* 10. *Gnophodes parmeno diversa* Butler.

Gn. *diversa*, Butl., Ann. Mag. Nat. Hist., (5), 5, p. 333 (1880).

*Melanitis diversa* (Butl.), Trimen, S. Afr. Buttl., 1, p. 116 (1887).

Gn. *parmeno* var. *diversa* Butl., Aurivillius, Rhop. Aeth., p. 46 (1898).

Eureka District (Dr. P. Rendall), ident. by Mr. H. Grose-Smith (W. L. Distant).

GENUS MYCALESIS, *HÜBNER*.

Verz. Bek. Schmett., p. 54 (1818-27); Trimen, S. Afr. Buttl., 1, p. 103 (1887); Auriv., Rhop. Aeth., p. 47 (1898).

11. *Mycalesis ena* Hewitson.

Ent. M. Mag., 14, p. 107 (1877); Trimen, Proc. Zool. Soc., p. 82 (1894); A. G. Butler, Proc. Zool. Soc., p. 903 (1898); Aurivillius, Rhop. Aeth., p. 54 (1898).

Shilouvane, March, May, and September (H. A. Junod), in Mus. Coll.; White River Settl. (H. L. L. Feltham).

12. *Mycalesis safitza* Hewitson.

Gen. Diurn. Lep., p. 394, pl. 66, f. 3 (1851); Exot. Buttl., 3, p. 80, pl. 40, f. 4 (1862); Trimen, S. Afr. Buttl., 1, p. 105 (1887); Auriv., Rhop. Aeth., p. 56 (1898).

Johannesburg, January (A. Ross); Shilouvane, March, April (H. A. Junod); Barberton, December (Gould), in Mus. Coll.; White River, December (A. T. Cooke).

13. *Mycalesis safitza evenus* Hopffer.

*M. evenus* Hopffer, Mon. K. Ak. Wiss. Berlin, 1885, p. 641, n. 13; Peters' Reise n. Mossamb. Ins., p. 393, pl. 25, ff. 3, 4 (1862).

*M. safitza* var. A. Trimen, S. Afr. Buttl., 1, p. 106 (1887).

*M. safitza* var. *evenus* Hopff. Aurivillius, Rhop. Aeth., p. 56 (1898).

Bronkhorstspuit (Major Ridley), in Mus. Coll.

## GENUS HENOTESIA, BUTLER.

Ann. Mag. Nat. Hist. (5) 4, p. 228 (1879); Aurivillius, Rhop. Aeth., p. 58 (1898).

*Mycalesis* Trimen, S. Afr. Buttl., 1, p. 103 (1887).

14. *Henotesia perspicua* (Trimen).

Aurivillius, Rhop. Aeth., p. 61 (1898).

*Mycalesis perspicua* Trim., Trans. Ent. Soc. Lond., 1873, p. 104, pl. 1, f. 3; S. Afr. Buttl., 1, p. 107 (1887).

Fairly common in the warmer parts.

15. *Henotesia perspicua simonsii* (Butler).

*Mycalesis simonsii* Butl., Ann. Mag. Nat. Hist., (4) 19, p. 458 (1877); Trimen, S. Afr. Buttl., 1, p. 109 (1887).

*Henotesia simonsii* Butl., Aurivillius, Rhop. Aeth., p. 63 (1898).

Pretoria (Dr. H. G. Breyer), in Mus. Coll.; Upper Limpopo River (F. H. Barker, teste R. Trimen).

## GENUS MENERIS, WESTWOOD.

Gen. Diurn. Lep., 2, p. 296 (1850); Trimen, S. Afr. Buttl., 1, p. 123 (1887); Aurivillius, Rhop. Aeth., p. 66 (1898).

Lethe part Trimen, S. Afr. Buttl., 1, p. 123 (1887).

16. *Meneris tulbaghia* (Linnaeus).

*Papilio tulbaghia* Linn., Mus. L. Ulr., p. 284 (1764).

*Meneris tulbaghia* (Linn.), Trimen, S. Afr. Buttfl., 1, p. 125 (1887); Aurivillius, Rhop. Aeth., p. 66 (1898).

Johannesburg, February (A. Ross), in Mus. Coll.; id., February, March (H. L. L. Feltham, A. T. Cooke, and A. Oehse); Elandsfontein (G. W. Jeffery); Barberton (Dr. P. Rendall, teste Distant).

17. *Meneris indosa* (Trimen).

Aurivillius, Rhop. Aeth., 1898, p. 66.

*Debis indosa* Trimen, Trans. Ent. Soc. Lond., 1879, p. 324.

*Lethe indosa* (Trimen), S. Afr. Buttfl., 1, p. 121, pl. 7, fig. 1 (1887).

Shilouvane, April, May (H. A. Junod), in Mus. Coll.; Lydenburg District (T. Ayres, teste Trimen).

## GENUS LEPTONEURA, WALLENGREN.

Rhop. Caffr., p. 31 (1857); Trimen, S. Afr. Buttfl., 1, p. 91 (1887); Aurivillius, Rhop. Aeth., p. 67 (1898).

18. *Leptoneura dingana* Trimen.

Lydenburg District (P. A. Krantz, in Mus. Coll.; T. Ayres, 1, p. 97 (1887); Aurivillius, Rhop. Aeth., p. 68 (1898).

Lydenburg District (P. A. Krantz, in Mus. Coll.; T. Ayres, teste Trimen).

\* 19. *Leptoneura bowkeri* Trimen.

Trans. Ent. Soc. Lond., p. 348, pl. 6, f. 2 (1870); S. Afr. Buttfl., 1, p. 98 (1887); Aurivillius, Rhop. Aeth., p. 68 (1898).

Lydenburg district (T. Ayres, teste Trimen).

20. *Leptoneura jansei* Swierstra.

Plate 26, Fig. 1.

Annals Transvaal Museum, I, p. 175 (1909).

Warmberg, near Pietersburg (A. J. T. Janse, in Mus. Coll.)

## GENUS COENYRA, HEWITSON.

Trans. Ent. Soc. Lond. (3), 2, p. 281 (1865); Trimen, S. Afr. Buttfl., 1, p. 68 (1887); Aurivillius, Rhop. Aeth., p. 68 (1898).

\* 21. *Coenyra hebe* (Trimen).

S. Afr. Buttfl., 1, p. 69 (1887); Aurivillius, Rhop. Aeth., p. 68 (1898).

*Yphtima hebe* Trim., Trans. Ent. Soc. Lond. (3), 1, p. 280 (1862); Rhop. Afr. Austr., 2, p. 205, pl. 4, f. 3 (1866).

White River, November (A. G. Cook).

\* 22. *Coenyra rufiplaga* Trimen.

Trans. Ent. Soc., p. 59, pl. 4, fig. 1 (1906).

Buiskop, near Warmbaths (H. Livingstone, teste R. Trimen).

GENUS *PHYSCÆNEURA*, *WALLENGREN*.

Lep. Rhop. Caffr., p. 32 (1857); Trimen, S. Afr. Buttl., 1, p. 71 (1887); Aurivillius, Rhop. Aeth., p. 69 (1898).

23. *Physcæneura panda* (Boisduval).

Trimen, S. Afr. Buttl., 1, p. 71 (1887); Aurivillius, Rhop. Aeth., p. 69 (1898).

Satyrus panda Bsd., App. Voy. de Deleg., 2, p. 594 (1847).

Erebia panda Hopff., Peter's R. n. Mossamb. Ins., p. 392, pl. 25, ff. 1, 2 (1862).

Daspoort, Pretoria District (C. J. Swierstra); Pienaars River, Pretoria District (R. v. Jutrezcka); Lydenburg District (P. A. Krantz); Kaapmuiden, March (Rev. Tomlinson), in Mus. Coll.; Nelspruit (A. G. Cook, A. T. Cooke, and H. L. L. Feltham).

GENUS *PSEUDONYMPHA*, *WALLENGREN*.

Lep. Rhop. Caffr., p. 31 (1857); Trimen, S. Afr. Buttl., 1, p. 73 (1887); Aurivillius, Rhop. Aeth., p. 69 (1898).

24. *Pseudonympha cassius* (Godart).

Trimen, S. Afr. Buttl., 1, p. 89 (1887); Aurivillius, Rhop. Aeth., p. 70 (1898).

Papilio hyperbius Cram, Pap. Ex., 11, pl. 168, ff. c. d. (1779).

Satyrus cassius Godt. (part) Enc. Meth., 9, p. 526 (1819?).

Lydenburg District (P. A. Krantz); Barberton, December (Gould); Waterval Onder, December (A. Ross); Shilouvane, November, March (H. A. Junod), in Mus. Coll.

\* 25. *Pseudonympha sabacus* (Trimen).

S. Afr. Buttl., 1, p. 85 (1887).

Erebia sabacus Trim., Rhop. Afr. Austr., 2, p. 200, pl. 4, f. 1 (1866).

Ps. magus (Fabr.), Aurivillius, Rhop. Aeth., p. 70 (1898).

Lydenburg District (T. Ayres, teste R. Trimen).

26. *Pseudonympha vigilans* Trimen.

S. Afr. Buttl., 1, p. 84 (1887); Aurivillius, Rhop. Aeth., p. 71 (1898).

Pretoria, February (C. J. Swierstra); Johannesburg, February (A. Ross); Waterval Onder, December (A. Ross), and Shilouvane, April, May, August (H. A. Junod), in Mus. Coll.; Johannesburg, March, December (A. G. Cook and H. L. L. Feltham); Heidelberg, December (A. Ochse); Buffelskloof No. 704, December (A. G. Cook).



27. *Pseudonympha narycia* Wallengren.

Lep. Rhop. Caff., p. 32 (1857); Trimen, S. Afr. Buttfl., 1, p. 77 (1887); Aurivillius, Rhop. Aeth., p. 71 (1898).

Pretoria District, February, March (C. J. Swierstra); Johannesburg, November (A. Ross); Lydenburg District (P. A. Krantz), in Mus. Coll.; Pretoria, December; Johannesburg, February, March, and December, Buffelskloof No. 704, Waterberg District, December (A. G. Cook); hills to the north of Johannesburg (H. L. L. Feltham); Heidelberg, December (A. Ochse); Boksburg, February, March, December (teste C. H. Pead); Pretoria, November, December, January; Middelburg, November (W. L. Distant); Potchefstroom District (T. Ayres, teste R. Trimen).

28. *Pseudonympha neita* Wallengren.

Ofvers. Vet. Akad. Forhandl., 32, 1, p. 84 (1857); Trimen, S. Afr. Buttfl., 1, p. 79, pl. 7, f. 2 (1887); Aurivillius, Rhop. Aeth., p. 71 (1898).

Doornfontein (A. Ross); Barberton, December (Gould), in Mus. Coll.; Barberton (Dr. Rendall, teste Distant); id., common (G. W. Jeffery); Warmbaths, January, Buffelskloof No. 704, Waterberg District, December (A. G. Cook); Transvaal (W. Morant and T. Ayres, teste R. Trimen).

## GENUS NEOCÆNYRA, BUTLER.

Proc. Zool. Soc., 1885, p. 758; Aurivillius, Rhop. Aeth., p. 72 (1898).

29. *Neocænyra natalii* (Boisduval).

Aurivillius, Rhop. Aeth., p. 72 (1898).

Satyrus natalii Bsd., App. Voy. de Deleg., p. 594 (1847).

*Pseudonympha natalii* (Bsd.), Trimen, S. Afr. Buttfl., p. 81 (1887).

Pienaars River, November (R. v. Jutrzenka); Lydenburg District (P. A. Krantz), in Mus. Coll.; Crocodile River, south of Shoshong (F. W. Barker, teste R. Trimen).

30. *Neocænyra duplex major* (Trimen).

Trans. Ent. Soc. Lond., 1906, p. 61, pl. 4, f. 2.

Barberton and Malalane, February (Gould), in Mus. Coll.; White River and Nelspruit, November (A. G. Cook); White River, November to January (A. T. Cooke and H. L. L. Feltham).

## GENUS YPTHEMA, WESTWOOD.

Gen. Diurn. Lep., 2, p. 394 (1851); Trimen, S. Afr. Buttfl., 1, p. 65 (1887); Aurivillius, Rhop. Aeth., p. 73 (1898).

31. *Ypthima asterope* (Klug).

Trimen, S. Afr. Buttl., 1, p. 66 (1887); Aurivillius, Rhop. Aeth., p. 77 (1898).

Hipparchia asterope, Klug. Symb. Phys., dec. 3, pl. 29, ff. 11-14 (1832).

Waterval Onder, April (A. Ross); Barberton, February (Gould); Kaapmuiden, March (Rev. Tomlinson); Lydenburg District (P. A. Krantz); Shilouvaue, August (H. A. Junod), in Mus. Coll.; White River, November (A. G. Cook, A. T. Cooke, and H. L. L. Feltham); Warmbaths, January (A. G. Cook); Barberton, January, and Zoutpansberg, May (W. L. Distant).

## FAMILY NYMPHALIDAE.

## SUB-FAMILY ACRAEINAE.

GENUS PARDOPSIS, *TRIMEN*.

S. Afr. Buttl., 1, p. 182 (1887); Aurivillius, Rhop. Aeth., p. 80 (1898).

\* 32. *Pardopsis punctatissima* (Boisduval).

Trimen, S. Afr. Buttl., 1, p. 183 (1887); Aurivillius, Rhop. Aeth., p. 81 (1898).

Acraea punctatissima, Bsd., Faune Ent. Mad., etc., 1, p. 31, pl. 6, f. 2 (1833).

Nelspruit, November, December (A. T. Cooke); Barberton, January (W. L. Distant).

GENUS ACRAEA, *FABRICIUS*.

Illiger's Mag., 4, p. 284 (1807); Trimen, S. Afr. Buttl., 1, p. 131 (1887); Aurivillius, Rhop. Aeth., p. 81 (1898).

\* 33. *Acraea rabbaiae* Ward.

Ent. M. Mag., 10, p. 152 (1873); Trimen, S. Afr. Buttl., 1, p. 133 (1887); Aurivillius, Rhop. Aeth., p. 83 (1898).

Komatipoort, one female, February, 1905 (G. W. Jeffery).

34. *Acraea burni* Butler.

Ann. Mag. Nat. Hist., (6) 18, p. 467 (1896); Proc. Zool. Soc., 1897, p. 841, pl. 50, f. 3; Aurivillius, Rhop. Aeth., p. 88 (1898).

Waterberg District, December (R. v. Jutrzenka); Waterval Onder, January (A. Ross); id., February (Rev. Tomlinson), in Mus. Coll.; Warmbaths, and junction of Nel River and Crocodile Rivers (H. L. L. Feltham); Nelspruit, November to February inclusive (A. G. Cook).

35. *Acraea horta* (Linnaeus).

Trimen, S. Afr. Buttl., 1, p. 134 (1887); Aurivillius, Rhop. Aeth., p. 89 (1898).

*Papilio horta* Linn., Mus. Lud. Reg., p. 134 (1764).

Pretoria District, January, August, December (C. J. Swierstra); Johannesburg, February (A. Ross); Waterval Onder, January (A. Ross); id., December (Dr. H. G. Breyer), in Mus. Coll.; Pretoria, August, December (A. G. Cook); id., August, November, December, February (W. L. Distant); Lydenburg District (T. Ayres, teste R. Trimen). Where it occurs, a common species.

36. *Acraea neobule* Doubleday.

Gen. Diurn. Lep., pl. 19, f. 3 (1848); Trimen, S. Afr. Buttl., 1, p. 137 (1887); Aurivillius, Rhop. Aeth., p. 89, 1898.

Fairly common all through the Transvaal.

37. *Acraea zetes acara* Hewitson.

Aurivillius, Rhop. Aeth., p. 91 (1898).

*A. acara* Hew., Exot. Buttl., 3, pl. 8, ff. 19, 20 (1865); Trimen, S. Afr. Buttl., 1, p. 159 (1887).

Throughout the year.

38. *Acraea barkeri* Trimen.

Trans. Ent. Soc. Lond., p. 433 (1881); S. Afr. Buttl., 1, p. 162 (1887); Aurivillius, Rhop. Aeth., p. 91 (1898).

Lydenburg District (P. A. Krantz), in Mus. Coll.; Warmbaths (H. L. L. Feltham).

39. *Acraea anemosa* Hewitson.

Exot. Buttl., 3, pl. 8, ff. 14, 15 (1865); Trimen, S. Afr. Buttl., 1, p. 157 (1887); Aurivillius, Rhop. Aeth., p. 91 (1898).

Pretoria, January, December (C. J. Swierstra); Waterval Onder, December (A. Ross); Louws Creek, September (Dr. L. Gough); Barberton, December (Gould); id., April (Miss De Beer); Waterberg District (R. v. Jutrencha); Lydenburg District (P. A. Krantz); Woodbush Village, December (C. J. Swierstra); Shilouvane, August (H. A. Junod), in Mus. Coll.; Barberton, common during summer months (G. W. Jeffery); White River, November (A. G. Cook and A. T. Cooke); White River, fairly common (H. L. L. Feltham); Nelspruit (A. G. Cook); Waterval Onder, December (A. Ochse); Warmbaths (A. G. Cook and H. L. L. Feltham); Haenertsburg, February (A. G. Cook).

40. *Acraea violarum* Boisduval.

App. Voy. de Del. dans l'Afr. Austr., p. 591 (1847); Trim., S. Afr. Buttl., 1, p. 141 (1887); Aurivillius, Rhop. Aeth., p. 95 (1898).  
 Barberton, December (Gould); Pietpotgietersrust, November (G. H. Burn), in Mus. Coll.; Barberton, June-January, common (G. W. Jeffery); Nelspruit, November (A. T. Cooke).

41. *Acraea asema* Hewitson.

Ent. Mont. Mag., 14, p. 52 (1887); Trimen, Proc. Zool. Soc., 1894, p. 24, pl. 4, ff. 3, 36; Aurivillius, Rhop. Aeth., p. 95 (1898).

Krabbefontein, December (Dr. H. G. Breyer); Shilouvane, January, April, September (H. A. Junod), in Mus. Coll.; Shilouvane (H. A. Junod, teste H. L. L. Feltham).

42. *Acraea anacreon* Trimen.

Trans. Ent. Soc. Lond., 1868, p. 77, pl. 6, ff. 3-5; S. Afr. Buttl., 1, p. 168 (1887); Aurivillius, Rhop. Aeth., p. 96 (1898).

Witpoortjekloof, near Krugersdorp, May (A. Ross); Roodepoort, April (H. L. L. Feltham); Waterval Onder, April (A. Ross); Barberton, December (Gould); Lydenburg (P. A. Krantz); Woodbush Village, December, common (C. J. Swierstra), in Mus. Coll.; Barberton, March and December (G. W. Jeffery); White River (A. G. Cook).

43. *Acraea acrita* Hewitson.

Exot. Buttl., 3, pl. 3, f. 18 (1865); Trimen, S. Afr. Buttl., 3, p. 381 (1889); Aurivillius, Rhop. Aeth., p. 96 (1898).

Komatipoort, December (Dr. H. G. Breyer), in Mus. Coll.; Komatipoort (A. T. Cooke, teste H. L. L. Feltham).

44. *Acraea nohara* Boisduval.

App. Voy. de Del. dans l'Afr. Austr., p. 590 (1847); Trimen, S. Afr. Buttl., 1, p. 142 (1887); Aurivillius, Rhop. Aeth., p. 97 (1898).

Crocodilepoort (East), November (C. J. Swierstra); Barberton, February, April (Miss De Beer and Gould); Shilouvane, January, May, September (H. A. Junod); Woodbush Village, August (Dr. L. Gough); id., December (C. J. Swierstra), in Mus. Coll.; White River Settl., December (H. L. L. Feltham); Haenertsburg, February (A. G. Cook).

45. *Acraea stenobea* Wallengren.

Wien. Ent. Monatschr., 1860, p. 35; Trimen, S. Afr. Buttl., 1, p. 153 (1887); Aurivillius, Rhop. Aeth., p. 98 (1898).

Waterberg District, December (R. v. Jutrzencka), in Mus. Coll.; Johannesburg, March; Weltevreden, October (A. G. Cook); Johannesburg, very scarce; Warmbaths, one specimen (H. L. L. Feltham).



46. *Acraea caldarena* Hewitson.

Ent. Mont. Mag., 14, p. 52 (1877); Trimen, S. Afr. Buttl., 1, p. 149 (1887); Aurivillius, Rhop. Aeth., p. 99 (1898).

Waterberg District, October, December (G. H. Burn); Lydenburg District (P. A. Krantz); Shilouvane, February, June, July, October, November (H. A. Junod), in Mus. Coll.; White River, November; Warmbaths, April; Buffelskloof No. 704, December (A. G. Cook); Johannesburg, two specimens (H. L. L. Feltham).

47. *Acraea aglaonice* Westwood.

App. Oates "Matabele Land," 1881, p. 346, pl. F, ff. 9, 10; Trimen, S. Afr. Buttl., 1, p. 151, pl. 3, f. 3 (1887); Aurivillius, Rhop. Aeth., p. 99 (1898).

Pretoria, May, June, August (C. J. Swierstra); Barberton, April (Miss De Beer); id., December (Gould); Komatipoort, December (Dr. H. G. Breyer); Lydenburg District (P. A. Krantz); Shilouvane, March, September (H. A. Junod), in Mus. Coll.; Johannesburg, May; White River, November (A. G. Cook, A. T. Cooke, and H. L. L. Feltham); Barberton, May, June, July, August (G. W. Jeffery); Warmbaths (H. L. L. Feltham).

48. *Acraea axina* Westwood.

Oates "Matabele Land," p. 344, pl. F, ff. 5, 6 (1881); Aurivillius, Rhop. Aeth., p. 99 (1898).

A. doubledayi, var. Trimen, S. Afr. Buttl., 1, p. 147 (1887).

Pretoria (Dr. H. G. Breyer); Waterberg District, November, December (G. H. Burn and R. v. Jutrzenska); Warmbaths, August (A. Ross); Shilouvane, July (H. A. Junod); Lydenburg District (P. A. Krantz); Crocodilepoort (East), November (C. J. Swierstra); Kaapmuiden, March (Rev. Tomlinson), in Mus. Coll.; Warmbaths (H. L. L. Feltham); id., January, April (A. G. Cook); Nelspruit, November, December (A. T. Cooke); Buffelskloof No. 704, December (A. G. Cook); White River Settl., November (A. G. Cook).

49. *Acraea oncaea* Hopffer.

Mon. Ak. Wiss. Berl., 1855, p. 640; Aurivillius, Rhop. Aeth., p. 100 (1898).

A. doubledayi Trimen, S. Afr. Buttl., 1, p. 147 (1887).

Pretoria District, April (C. J. Swierstra); Waterval Onder, December (Dr. H. G. Breyer); id., January (A. Ross); Komatipoort, December (Dr. H. G. Breyer); Lydenburg District (P. A. Krantz); Krabbefontein, December (Dr. H. G. Breyer); Shilouvane, March, July (H. A. Junod), in Mus. Coll.; Komatipoort, common (G. W. Jeffery); Warmbaths, Shilouvane (H. L. L. Feltham).

50. *Acraea natalica* Boisduval.

App. Voy. Deleg. dans l'Afr. Austr., p. 590 (1847); Trim., S. Afr. Buttl., 1, p. 155 (1887); Aurivillius, Rhop. Aeth., p. 100 (1898).

Pretoria, February (C. J. Swierstra); Waterval Onder, December (Dr. H. G. Breyer); Barberton, March (Miss De Beer); id., December (Gould); Malalane, February (Gould), in Mus. Coll.; Johannesburg, January, February (A. G. Cook); id., April (A. Ochse); id. (H. L. L. Feltham); Barberton, fairly common (G. W. Jeffery).

51. *Acraea rahira* Boisduval.

Faune Ent. Madag., etc., p. 33, pl. 5, ff. 4, 5 (1833); Trim., S. Afr. Buttl., 1, p. 166 (1887); Aurivillius, Rhop. Aeth., p. 103 (1898).

Pretoria, September, November (C. J. Swierstra); Johannesburg, January, April, November (A. Ross); Pietpotgietersrust, November (G. H. Burn); Woodbush Village, December (C. J. Swierstra); Crocodilepoort (East), November (C. J. Swierstra), in Mus. Coll.; Johannesburg, January, March (A. G. Cook); id. (H. L. L. Feltham); Buffelskloof No. 704, December (A. G. Cook); Warmbaths (H. L. L. Feltham).

52. *Acraea terpsichore rougeti* Guérin.

Aurivillius, Rhop. Aeth., p. 104 (1898).

A. rougeti Guér., Lefeb. Voy. Abyss., 6, p. 368, pl. 10, ff. 6, 7 (1849).

A. buxtoni Trimen, S. Afr. Buttl., 1, p. 170 (1887).

Pretoria (Dr. H. G. Breyer); Lydenburg District (P. A. Krantz); Malalane, February (Gould); Barberton, February, December (Gould); id., April (Miss De Beer); Shilouvane, April, August, September (H. A. Junod), in Mus. Coll.; Johannesburg (H. L. L. Feltham); Buffelskloof, December; White River, November (A. G. Cook); Barberton District, fairly common (G. W. Jeffery).

53. *Acraea cabira natalensis* Staudinger.

Aurivillius, Rhop. Aeth., p. 106 (1898).

A. natalensis St., Iris, 9, p. 206 (1896).

A. cabira Trimen, S. Afr. Buttl., 1, p. 173 (1887).

Krabbefontein, December (Dr. H. G. Breyer); Shilouvane, March, August (H. A. Junod); Barberton, February (Gould); id., March (Miss De Beer); Malalane, February (Gould), in Mus. Coll.; Barberton District, fairly common (G. W. Jeffery); Falls of Crocodile River East (H. L. L. Feltham).

54. *Acraea encedon* Linnaeus.

Syst. Nat., ed. 10, p. 488 (1758), Trimen, S. Afr. Buttl., 1, p. 163 (1887); Aurivillius, Rhop. Aeth., p. 110 (1898).

Shilouvane, September (H. A. Junod); Lydenburg District (P. A. Krantz); Crocodilepoort (East), November (C. J. Swierstra); Barberton, December (Gould); id., April (Miss De Beer), in Mus. Coll.; Barberton District, local (G. W. Jeffery).

55. *Acraea esebria protea* Trimen.

Aurivillius, Rhop. Aeth., p. 115 (1898).

Planema esebria var. A. Trimen, S. Afr. Buttl., 1, p. 178 (1887).

Acraea protea Trim., Rhop. Afr. Austr. 1, p. 110 (1866).

Barberton, March (Miss De Beer); id., December (Gould); Lydenburg District (P. A. Krantz); Shilouvane, May (H. A. Junod), in Mus. Coll.; Barberton District, common (G. W. Jeffery).

## GENUS PLANEMA, DOUBLEDAY.

Gen. Diurn. Lep., 1, p. 140 (1848); Trimen, S. Afr. Buttl., 1, p. 175 (1887); Aurivillius, Rhop. Aeth., p. 117 (1898).

56. *Planema aganice* (Hewitson).

Trimen, S. Afr. Buttl., 1, p. 180 (1887); Aurivillius, Rhop. Aeth., p. 121 (1898).

*Acraea aganice* Hew. Exot. Buttl., 1, pl. 29, f. 6 (1852).

Shilouvane, January, March, May (H. A. Junod); Barberton, December (Gould), in Mus. Coll.; Barberton, fairly common (G. W. Jeffery); White River Settlement, December (H. L. L. Feltham).

## SUB-FAMILY NYMPHALINAE. TRIBUS ARGYNNIDIDI.

## GENUS LACHNOPTERA, DOUBLEDAY.

Gen. Diurn. Lep., 1, p. 161 (1848); Trimen, S. Afr. Buttl., 1, p. 195 (1887); Aurivillius, Rhop. Aeth., p. 124 (1898).

57. *Lachnoptera ayresi* Trimen.

Trans. Ent. Soc. Lond., 1879, p. 326; S. Afr. Buttl., 1, p. 196, pl. 3, ff. 5, 5a (1887); Aurivillius, Rhop. Aeth., p. 124 (1898).

Barberton, December (Gould); Shilouvane, April (H. A. Junod), in Mus. Coll.; Shilouvane (H. A. Junod), in H. L. L. Feltham's Coll.

## GENUS ATELLA, DOUBLEDAY.

Gen. Diurn. Lep., 1, p. 165 (1848); Trimen, S. Afr. Buttl., p. 188 (1887); Aurivillius, Rhop. Aeth., p. 125 (1898).

58. *Atella columbina* (Cramer).

Trimen, S. Afr. Buttl., 1, p. 193 (1887); Aurivillius, Rhop. Aeth., p. 126 (1898).

*Papilio columbina* Cram., Pap. Exot., 3, p. 76, pl. 238, ff. A, B.

Pretoria, January (C. J. Swierstra); Waterberg District, December (R. v. Jutrzencka); Shilouvane, August (H. A. Junod); Waterval Onder, January (A. Ross); Barberton, December (Gould); id., March, April (Miss De Beer), in Mus. Coll.; "Not common at Barberton" (G. W. Jeffery).

59. *Atella phalantha* (Drury).

Trimen, S. Afr. Buttl., 1, p. 189 (1887); Aurivillius, Rhop. Aeth., p. 126 (1898).

*Papilio phalantha* Drury, Ill. Nat. Hist., 1, pl. 21, ff. 1, 2 (1770).

Fairly common throughout the Transvaal.

## TRIBUS VANESSIDI.

GENUS HYPANARTIA, *KIRBY*.

Cat. D. Lep., p. 180 (1871); Aurivillius, Rhop. Aeth., p. 129 (1898).

Eurema Doubl., Trimen, S. Afr. Buttfl., 1, p. 203 (1887).

\* 60. *Hypanartia schoeneia* (Trimen).

Aurivillius, Rhop. Aeth., p. 129 (1898).

Eurema schoeneia Trimen, Trans. Ent. Soc. Lond., 1879, p. 329; S. Afr. Buttfl., 1, p. 207, pl. 4, f. 1 (1887).

Barbington, January (W. L. Distant).

GENUS PYRAMEIS, *HÜBNER*.

Verz. Bek. Schmett., p. 33 (1816); Trimen, S. Afr. Buttfl., 1, p. 198 (1887); Aurivillius, Rhop. Aeth., p. 130 (1898).

61. *Pyrameis cardui* (Linnaeus).

Trimen, S. Afr. Buttfl., 1, p. 200 (1887); Aurivillius, Rhop. Aeth., p. 130 (1898).

*Papilio cardui* Linn., Syst. Nat., ed. 10, p. 475 (1758).

Common throughout the Transvaal.

GENUS PRECIS, *HÜBNER*.

Ver. Bek. Schmett., p. 33 (1816); Trimen, S. Afr. Buttfl., 1, p. 219 (1887); Aurivillius, Rhop. Aeth., p. 131 (1898).

62. *Precis orithya boöpis* (Trimen).

*Junonia boöpis* Trimen, Trans. Ent. Soc. Lond., 1879, p. 331; S. Afr. Buttfl., 1, p. 217, pl. 4, f. 2 (1887).

*Precis orithya madagascariensis* Guené, Aurivillius, Rhop. Aeth., p. 135 (1898).

All over the Transvaal, but nowhere plentiful.

63. *Precis clelia* (Cramer).

Aurivillius, Rhop. Aeth., p. 135 (1898).

*Papilio clelia* Cr., Pap. Exot., 1, pl. 21, ff. E, F (1779).

*Junonia clelia* (Cr.) Trimen, S. Afr. Buttfl., 1, p. 214 (1887).

Throughout the Transvaal; not very common.

64. *Precis oenone cebrene* (Trimen).

Aurivillius, Rhop. Aeth., p. 135 (1898).

*Junonia cebrene* Trimen, Trans. Ent. Soc., Lond., 1870, p. 353; S. Afr. Buttfl., 1, p. 210 (1887).

The commonest *Precis* in the Transvaal.



65. *Precis octavia natalensis* Staudinger.

Aurivillius, Rhop. Aeth., p. 136 (1898).

*Precis natalensis* Staud., Exot. Schmett., 1, p. 101 (1885).

*P. octavia* Trimen, S. Afr. Buttl., 1, p. 229 (1887).

Johannesburg, February (A. Ross); Pretoria, January (C. J. Swierstra); Lydenburg District (P. A. Krantz); Barberton (Miss De Beer); Krabbefontein, December (Dr. H. G. Breyer); Shilouvane, December (H. A. Junod), in Mus. Coll.; Johannesburg, December and January (A. G. Cook), id. (H. L. L. Feltham); Auckland Park, March (A. Ochse); White River (A. T. Cooke); Barberton, fairly common (G. W. Jeffery).

66. *Precis octavia sesamus* Trimen.

Aurivillius, Rhop. Aeth., p. 137 (1898).

*P. sesamus* Tr., Ent. Soc. Lond., 1883, p. 347; S. Afr. Buttl., 1, p. 231, pl. 4, f. 3.

Pretoria, March (C. J. Swierstra); Johannesburg, March (A. Ross); Lydenburg District (P. A. Krantz); Barberton, March (Gould); Woodbush Vill., August (Dr. L. Gough); Shilouvane, May, August (H. J. Junod), in Mus. Coll.; Johannesburg (H. L. L. Feltham), id., February to July (A. G. Cook); Auckland Park, March (A. Ochse); White River (A. T. Cooke); Barberton, common (G. W. Jeffery).

67. *Precis simia* Wallengren.

Lep. Rhop. Caffr., p. 26 (1857); Trimen, S. Afr. Buttl., 1, p. 227 (1887); Aurivillius, Rhop. Aeth., p. 137 (1898).

Shilouvane, May (H. A. Junod), in Mus. Coll.

68. *Precis tukuoa* (Wallengren).

Lep. Rhop. Caffr., p. 25 (1857); Trimen, S. Afr. Buttl., 1, p. 226 (1887); Aurivillius, Rhop. Aeth., p. 138 (1898).

Pretoria, March (C. J. Swierstra); Johannesburg, March and June (A. Ross); Lydenburg District (P. A. Krantz); Shilouvane, September (H. A. Junod), in Mus. Coll.; Johannesburg, Fountains Valley, and Warmbaths (H. L. L. Feltham); Auckland Park, March (A. Ochse); Witpoortje, January (A. G. Cook); White River (A. T. Cooke); Barberton, fairly common (G. W. Jeffery).

69. *Precis ceryne* (Boisduval).

Trimen, S. Afr. Buttl., 1, p. 224 (1887); Aurivillius, Rhop. Aeth., p. 138 (1898).

*Salamis ceryne* Bsd., App. Voy. de Deleg., p. 592 (1847).

Wonderboom Poort, Pretoria District, February (C. J. Swierstra); Johannesburg, March (A. Ross); Barberton, December (Gould), in Mus. Coll.; Buffelskloof No. 704, Waterberg District, December (A. G. Cook); Johannesburg (H. L. L. Feltham).

70. *Precis milonia tugela* Trimen.

Aurivillius, Rhop. Aeth., p. 140 (1898).

*Precis tugela* Trimen, Trans. Ent. Soc. Lond., 1879, p. 334; S. Afr. Buttl., 1, p. 241, pl. 4, f. 5 (1887).

Barberton, April (Miss De Beer); Shilouvane, May (H. A. Junod), in Mus. Coll.; Shilouvane (H. A. Junod, per H. L. L. Feltham).

71. *Precis archesia* (Cramer).

Trimen, S. Afr. Buttl., 1, p. 234; Aurivillius, Rhop. Aeth., 1, p. 140 (1898).

*Papilio archesia* Cram., Pap. Exot., 3, p. 44, pl. 219, f. D, E (1779).

Pretoria, April (C. J. Swierstra); Johannesburg, March (A. Ross); Lydenburg District (P. A. Krantz); Barberton, March (Miss De Beer), in Mus. Coll.; Johannesburg (H. L. L. Feltham); id., March (A. Ochse); id., April (A. G. Cook); White River (A. T. Cooke); Barberton, March, May, June, July, fairly common (G. W. Jeffery).

72. *Precis archesia pelasgis* (Godart).

Aurivillius, Rhop. Aeth., p. 140 (1898).

*Vanessa pelasgis* Godt., Enc. Mett., 9, p. 820 (1823).

*Precis pelasgis* Trimen, S. Afr. Buttl., 1, p. 236 (1887).

Pretoria, January (C. J. Swierstra); Johannesburg, February (A. Ross); Barberton, January, March (Miss De Beer); id., December (Gould); Shilouvane, January (H. A. Junod), in Mus. Coll.; Pretoria, December (A. G. Cook); Johannesburg (H. L. L. Feltham); id., January (A. G. Cook); White River, A. T. Cooke).

73. *Precis terea elgiva* (Hewitson).

Aurivillius, Rhop. Aeth., p. 142 (1898).

*Junonia elgiva* Hew., Exot. Buttl., 3, pl. 13, f. 1 (1864).

*Precis elgiva* Trimen, S. Afr. Buttl., 1, p. 240 (1887).

Shilouvane, May (H. A. Junod); Malalane, Februarv (Gould), in Mus. Coll.; Nelspruit, May (A. T. Cooke); Barberton, seen but not taken (G. W. Jeffery).

74. *Precis natalica* Felder.

Wien. Ent. Monats., 4, p. 106 (1860); Trimen, S. Afr. Buttl., 1, p. 238 (1887); Aurivillius, Rhop. Aeth., p. 142 (1898).

Shilouvane, July (H. A. Junod), in Mus. Coll.; Barberton, not common (G. W. Jeffery); Nelspruit (A. T. Cooke).

## GENUS CATACROPTERA, KARSCH.

Berl. Ent. Zeitschr., 39, p. 2 (1894); Aurivillius, Rhop. Aeth., p. 143 (1898).

75. *Catacroptera cloantha* (Cramer).

Aurivillius, Rhop. Aeth., p. 143 (1898).

Papilio cloantha Cram., Pap. Exot. 3, p. 93, pl. 338, ff. A, B (1782).

Precis cloantha Trim., S.A.B. I, p. 222 (1887).

Throughout the Transvaal, in some seasons very common.

GENUS SALAMIS, *BOISDUVAL*.

Faune Ent. de Mad., etc., p. 46 (1833).

Trimen, S. Afr. Buttl., 1, p. 243 (1887).

Aurivillius, Rhop. Aeth., p. 144 (1898).

76. *Salamis ancardii parhassus* Drury.

Aurivillius, Rhop. Aeth., p. 145 (1898).

Papilio parhassus Dr., Il. Nat. Hist., 3, pl. 4, ff. 1, 2 (1872).

Salamis ancardii Trimén, S. Afr. Buttl., 1, p. 244 (1887).

Lydenburg (P. A. Krantz); Barberton, March (Miss De Beer); Barberton, December (Gould); Shilouvane, April, May (H. A. Junod), in Mus. Coll.; Barberton District, common (G. W. Jeffery); White River, Nelspruit (A. T. Cooke and H. L. L. Feltham).

GENUS HYPOLIMNAS, *HÜBNER*.

Verz. Bek. Schmett., p. 45 (1816-26); Aurivillius, Rhop. Aeth., p. 146 (1898).

77. *Hypolimnas misippus* (Linnaeus).

Aurivillius, Rhop. Aeth., p. 147 (1898).

Papilio misippus Linn., Mus. Led. Ulr. Reg., p. 264 (1764).

Diadema misippus Trimén, S. Afr. Buttl., 1, p. 277 (1887).

Throughout the Transvaal; fairly common.

78. *Hypolimnas misippus alcippoides* (Butler).

Aurivillius, Rhop. Aeth., p. 148 (1898).

H. alcippoides Butl., Ann. Mag. Nat. Hist. (5) 12, p. 102 (1883); Trimén, S. Afr. Buttl., 3, p. 404 (1898).

Pretoria (C. J. Swierstra), in Mus. Coll.; Johannesburg (H. L. L. Feltham); White River (A. T. Cooke).

79. *Hypolimnas misippus inaria* (Cramer).

Aurivillius, Rhop. Aeth., p. 148 (1898).

Papilio inaria Cram., Pap. Exot., 3, p. 36, pl. 214, ff. A, B (1779).

Diadema misippus var. inaria Trimén, S. Afr. Buttl., 1, p. 278 (1887).

Pretoria, February (Dr. L. Gough and C. J. Swierstra); Johannesburg, March (A. Ross), in Mus. Coll.; Johannesburg (H. L. L. Feltham), id., April (A. G. Cook).

80. *Hypolimnas dubius mimia* (Trimen).

Aurivillius, Rhop. Aeth., p. 150 (1898).

Diadema mimia Trimen, Trans. Ent. Soc., Lond., 26, p. 505, note (1869).

Euralia mimia, Trimen, S. Afr. Buttl., 1, p. 284 (1887).

Barberton, April (Miss De Beer), id., December (Gould), in Mus. Coll.; Barberton, fairly common (G. W. Jeffery).

81. *Hypolimnas anthedon wahlbergi* (Wallengren).

Aurivillius, Rhop. Aeth., p. 151 (1898).

Diadema wahlbergi Wallgr., Lep. Rhop. Caffr., p. 27 (1857).

Euralia wahlbergi Trimen, S. Afr. Buttl., 1, p. 282, pl. 6, f. 2 (1887).

Barberton, February, December (Gould), in Mus. Coll.; Barberton, fairly common (G. W. Jeffery).

## TRIBUS EURYTELIDI.

GENUS EURYTELA, *BOISDUVAL*.

Faune Ent. de Madag., etc., p. 54 (1833); Trimen, S. Afr. Buttl., 1, p. 256 (1887); Aurivillius, Rhop. Aeth., p. 153 (1898).

82. *Eurytela hiarbas angustata* Aurivillius.

Ent. Tidskr., 15, p. 278 (1894); Rhop. Aeth., p. 154 (1898).

Eurytela hiarbas Trimen, S. Afr. Buttl., 1, p. 258 (1887).

Malalane, February (Gould); Barberton, January, December (Gould); Shilouvane, March (H. A. Junod), in Mus. Coll.; Barberton, common (G. W. Jeffery).

83. *Eurytela dryope angulata* Aurivillius.

Rhop. Aeth., p. 154 (1898).

Eurytela dryope Trimen, S. Afr. Buttl., 1, p. 261 (1887).

Shilouvane, May (H. A. Junod), in Mus. Coll.; Barberton (G. W. Jeffery).

GENUS BYBLIA, *HÜBNER*.

Verz. Bek. Schmett., p. 28 (1816-26); Aurivillius, Rhop. Aeth., p. 157 (1898).

Hypanis Bsd., Trimen, S. Afr. Buttl., 1, p. 263 (1887).

84. *Byblia ilithyia* (Drury).

Aurivillius, Rhop. Aeth., p. 158 (1898).

Papilio ilithyia Drury, Ill. Nat. Hist., 2, pl. 17, ff. 1, 2.

Hypanis ilithyia Trimen, S. Afr. Buttl., 1, p. 264 (1887).

Pretoria, December (Dr. H. G. Breyer), id., February (C. J. Swierstra); Barberton, February, December (Gould); Kaapmuiden, March (Rev. Tomlinson); Shilouvane, March and April (H. A. Junod), in Mus. Coll.; Johannesburg, August (H. L. L. Feltham), id., March, April, May (A. G. Cook).



85. *Byblia götzius vulgaris* Staudinger.

Aurivillius, Rhop. Aeth., p. 159 (1898); Staud., Exot. Schmett., 1, p. 106 (1886).

Hypanis ilithyia var. A. Trimen, S. Afr. Buttl., 1, p. 266 (1887).

Lydenburg District (P. A. Krantz); Barberton, December (Gould), in Mus. Coll.; Johannesburg, May, and White River, December (H. L. L. Feltham).

GENUS CRENIS, *BOISDUVAL*.

Faune Ent. de Madag., etc., p. 48 (1833).

Trimen, S. Afr. Buttl., 1, p. 248 (1887).

Aurivillius, Rhop. Aeth., p. 159 (1898).

\* 86. *Crenis natalensis* Boisduval.

App. Voy. de Deleg., p. 592 (1847); Trimen S. Afr. Buttl., 1, p. 250, pl. 5, f. 1 (1898); Aurivillius, Rhop. Aeth., p. 161 (1898).

Nelspruit (A. T. Cooke); Lydenburg District (T. Ayres, teste R. Trimen).

## TRIBUS NEPTIDIDI.

GENUS NEPTIS, *FABRICIUS*.

Illiger's Magaz., 6, p. 282 (1807); Trimen S. Afr. Buttl., 1, p. 268 (1887); Aurivillius, Rhop. Aeth., p. 163 (1898).

87. *Neptis saclava* Boisduval.

Faune Madag., p. 49 (1833); Aurivillius, Rhop. Aeth., p. 166 (1898).

Neptis marpessa Trimen, S. Afr. Buttl., 1, p. 272 (1887).

Barberton, April (Miss De Beer); Shilouvane, May (H. A. Junod), in Mus. Coll.; Barberton, not common (G. W. Jeffery); White River and Nelspruit (A. T. Cooke); Orange Grove, near Johannesburg, one specimen (H. L. L. Feltham).

88. *Neptis agatha* (Stoll).

Trimen, S. Afr. Buttl., 1, p. 270 (1887); Aurivillius, Rhop. Aeth., p. 167 (1898).

Papilio agatha Stoll, in Cramer's Pap. Exot., 4, p. 75, pl. 327, ff. A, B (1782).

Lydenburg District (P. A. Krantz); Malalane, February (Gould); Louws Creek, September (Dr. L. Gough); Barberton, March (Miss De Beer); Shilouvane, May-August (H. A. Junod), in Mus. Coll.; White River (A. T. Cooke); Barberton, fairly common (G. W. Jeffery); Nelspruit, November (A. G. Cook); Crocodile River, east (H. L. L. Feltham).

## TRIBUS NYMPHALIDI.

## GENUS PSEUDACRAEA, WESTWOOD.

Gen. Diurn. Lep., p. 281 (1850); Trimen, S. Afr. Buttl., 1, p. 288 (1887); Aurivillius, Rhop. Aeth., p. 172 (1898).

89. *Pseudacraea boisduvali trimeni* Butler.

Aurivillius, Rhop. Aeth., 1, p. 176 (1898).

Ps. trimeni Butl., Ent. Mon. Mag., 11, p. 57 (1874); Trimen, S. Afr. Buttl., 1, p. 296 (1887).

Malalane, February (Gould); Shilouvane (Junod), in Mus. Coll.

## GENUS HAMANUMIDA, HÜBNER.

Verz. Bek. Schmett., p. 18 (1816); Trimen, S. Afr. Buttl., 1, p. 307 (1887); Aurivillius, Rhop. Aeth., p. 181 (1898).

90. *Hamanumida daedalus* (Fabricius).

Trimen, S. Afr. Buttl., 1, p. 309 (1887); Aurivillius, Rhop. Aeth., p. 181 (1898).

Papilio daedalus Fabr., Syst. Ent., p. 482 (1775).

Throughout the Transvaal, but common only in suitable localities.

## GENUS CYMOTHOE, HÜBNER.

Ver. Bek. Schmett., p. 39 (1818-27); Aurivillius, Rhop. Aeth., p. 207 (1898).

Harma Westw., Trimen, S. Afr. Buttl., 1, p. 310 (1887).

91. *Cymothoe alcimede* (Godart).

Aurivillius, Rhop. Aeth., p. 215 (1898).

Nymphalis alcimede Godt., Enc. Meth., 9, p. 384 (1819).

Harma alcimede Trimen, S. Afr. Buttl., 1, p. 312 (1887).

Malalane, February (Gould), in Mus. Coll.; Lydenburg District (T. Ayres, teste Trimen).

## TRIBUS CHARAXIDI.

## GENUS CHARAXES, OCHSENHEIMER.

Schmett. Europ., 4, p. 18 (1816); Trimen, S. Afr. Buttl., 1, p. 315 (1887); Auriv., Rhop. Aeth., p. 221 (1898).

92. *Charaxes brutus natalensis* Staudinger.

Exot. Schmett., 1, p. 169 (1886); Aurivillius, Rhop. Aeth., p. 231 (1898).

Ch. Brutus Trimen, S. Afr. Buttl., 1, p. 335 (1887).

Barborton, March (Miss De Beer); Shilouvane (H. A. Junod), in Mus. Coll.; Barborton, not common (G. W. Jeffery); White River (A. T. Cooke).

93. *Charaxes pelias saturnus* Butler.

Aurivillius, Rhop. Aeth., p. 232 (1898).

Ch. saturnus Butl., Proc. Zool. Soc., 1865, p. 624, pl. 36, f. 1 (1866); Trimen, S. Afr. Buttl., 1, p. 334 (1887).

Pretoria, February (H. G. Breyer and C. J. Swierstra); Waterberg District, January (R. v. Jutrencha); Shilouvane, May (H. A. Junod), in Mus. Coll.; Johannesburg, May (A. Ochse); Fountains, Pretoria, Warmbaths, common (H. L. L. Feltham); Warmbaths, April, Buffelskloof, December (A. G. Cook).

94. *Charaxes druceanus* Butler.

Cist. Ent., 1, p. 4, n. 1 (1869); Trimen, S. Afr. Buttl., 1, p. 329 (1887); Aurivillius, Rhop. Aeth., p. 233 (1898).

Lydenburg District (P. A. Krantz); Shilouvane, May (H. A. Junod), in Mus. Coll.

95. *Charaxes acharmenes* Felder.

Reise d. Novara, Lep. 3, p. 446, pl. 59, ff. 6, 7 (1867); Trimen, S. Afr. Buttl., 1, p. 340 (1887); Aurivillius, Rhop. Aeth., p. 234 (1898).

Lydenburg District (P. A. Krantz); Malalane, February (Gould); Barberton, February (Miss De Beer); Shilouvane, September (H. A. Junod), in Mus. Coll.

96. *Charaxes etheocles chanleri* Holland.

Aurivillius, Rhop. Aeth., p. 237 (1898).

Ch. chanleri Holl., Proc. U.S. Nat. Mus., 18, p. 262 (1895).

Waterberg District (R. v. Jutrencha); Shilouvane, March, September, October (H. A. Junod), in Mus. Coll.; Warmbaths, April, Buffelskloof No. 704, December (A. G. Cook); Wonderboompoort, May (R. O. Basson).

\* 97. *Charaxes ethalion* Boisduval.

App. Voy. de Deleg., p. 593 (1847); Trimen, S. Afr. Buttl., 1, p. 342 (1887).

Ch. etheocles ethalion Aurivillius, Rhop. Aeth., p. 237 (1898).

Barberton, fairly common (G. W. Jeffery).

98. *Charaxes xiphares* (Cramer).

Trimen, S. Afr. Buttl., 1, p. 346 (1887); Aurivillius, Rhop. Aeth., p. 239 (1898).

Papilio xiphares Cram., Pap. Exot. 4, p. 171, pl. 377, ff. A, B (1781).

Barberton, December (Gould), id., January (G. W. Jeffery), in Mus. Coll.

99. *Charaxes jahlusa* (Trimen).

S. Afr. Buttl., 1, p. 325 (1887); Aurivillius, Rhop. Aeth., p. 240 (1898).

*Nymphalis jahlusa* Trimen, Rhop. Afr. Austr. 1, p. 177 (1862).

Waterberg District, December, January (R. v. Jutrzenka), in Mus. Coll.; Warmbaths (H. L. L. Feltham); Buffelskloof No. 704, December (A. G. Cook).

\* 100. *Charaxes candiope* (Godart).

Trimen, S. Afr. Buttl., 1, p. 327, pl. 6, f. 4 (1887); Aurivillius, Rhop. Aeth., p. 240 (1898).

*Nymphalis candiope* Godt., Enc. Meth., 9, p. 353 (1819).

Limpopo River (F. C. Selous, teste Trimen); Wonderboompoort, May (R. O. Basson), in Mus. Coll.

101. *Charaxes varanes* (Cramer).

Trimen, S. Afr. Buttl., 1, p. 321 (1887); Aurivillius, Rhop. Aeth., p. 241 (1898).

*Papilio varanes* Cram., Pap. Exot., 2, p. 100, pl. 160, ff. D, E (1719).

Barberton, December, February (Gould); Shilouvane, June (H. A. Junod), in Mus. Coll.; Barberton, fairly common (G. W. Jeffery); White River, Nelspruit (A. T. Cooke).

102. *Charaxes zoölinea* (Westwood).

Trimen, S. Afr. Buttl., 1, p. 318 (1887); Aurivillius, Rhop. Aeth., p. 243 (1898).

*Nymphalis zoölinea*, Westw. Gen. Diurn. Lep., pl. 3, f. 1 (1850). Shilouvane (H. A. Junod), in Mus. Coll.

## FAMILY LYCAENIDAE.

## SUB-FAMILY LIPTENINAE.

GENUS ALAENA, *BOISDUVAL*.

Voy. de Deleg., 2, p. 591 (1847); Trimen, S. Afr. Buttl., 2, p. 222 (1887); Aurivillius, Rhop. Aeth., p. 254 (1898).

103. *Alaena amazoula* Boisduval.

App. Voy. de Deleg. dans l'Afr. Austr., p. 591 (1847).

Trimen, S. Afr. Buttl., 2, p. 223 (1887); Aurivillius, Rhop. Aeth., p. 255 (1898).

Shilouvane, April, March, November (H. A. Junod) Barberton, April (Miss De Beer), in Mus. Coll.; Barberton, common (G. W. Jeffery); Nelspruit (A. T. Cooke); near Warmbaths (H. L. L. Feltham).



GENUS D'URBANIA, *TRIMEN*.

Trans. Ent. Soc. Lond. (3), 1, p. 400 (1862); S. Afr. Buttl., 2, p. 213 (1887); Aurivillius, Rhop. Aeth., p. 264 (1898).

\* 104. *D'Urbania amakosa* Trimen.

Trans. Ent. Soc. Lond. (3), 1, p. 401 (1862); S. Afr. Buttl., 2, p. 215 (1887); Aurivillius, Rhop. Aeth., p. 264 (1898).

Barberton, top of Rymers Creek, common (G. W. Jeffery); Lydenburg District (T. Ayres, teste Trimen).

\* 105. *D'Urbania limbata* Trimen.

S. Afr. Buttl., 2, p. 217 (1887); Aurivillius, Rhop. Aeth., p. 265 (1898).

Transvaal (teste Aurivillius).

GENUS TERIOMIMA, *KIRBY*.

Ann. Mag. Nat. Hist., (5), 19, p. 363 (1887); Aurivillius, Rhop. Aeth., p. 270 (1898).

106. *Teriomima aslauga* (Trimen).

Aurivillius, Rhop. Aeth., p. 271 (1898).

Liptena aslauga Trimen, Tr. Ent. Soc. 1873, p. 117.

D'Urbania aslauga Trimen, S. Afr. Buttl., 2, p. 220; pl. 9, ff. 9, 9a (1887).

Moorddrift, Waterberg District, November (C. J. Swierstra), in Mus. Coll.

107. *Teriomima pallida* (Trimen).

Trans. Ent. Soc. Lond., 1898, p. 12, pl. 1, ff. 7, 8 (1898).

Aurivillius, Rhop. Aeth., p. 271 (1898).

Transvaal (Dr. H. G. Breyer), in Mus. Coll.

## SUB-FAMILY LYCAENINAE.

GENUS LACHNOCNEMA, *TRIMEN*.

S. Afr. Buttl., 2, p. 233 (1887); Aurivillius, Rhop. Aeth., p. 301 (1898).

108. *Lachnocnema bibulus* (Fabricius).

Trimen, S. Afr. Buttl., 2, p. 235 (1887); Aurivillius, Rhop. Aeth., p. 301 (1898).

Moorddrift, Waterberg District, November (C. J. Swierstra); Woodbush Village, August (Dr. L. Gough), in Mus. Coll.; Crocodilepoort, Magaliesberg, and Warmbaths (H. L. L. Feltham); White River, all summer (A. T. Cooke); Komatipoort (G. W. Jeffery).

109. *Lachnocnema D'Urbania* Trimen.

S. Afr. Buttl., 2, p. 236 (1887); Aurivillius, Rhop. Aeth., p. 301 (1898).

Shilouvane, March (H. A. Junod), in Mus. Coll.; De Kroon No. 420, April (A. G. Cook).

## GENUS DEUDORIX, HEWITSON.

Illustr. Diurn. Lep., p. 16 (1862); Trimen, S. Afr. Buttl., 2, p. 105 (1887); Aurivillius, Rhop. Aeth., p. 302 (1898).

110. *Deudorix licinia* (Mabille).

Trimen, S. Afr. Buttl., 2, p. 111 (1887); 3, p. 411 (1889); Aurivillius, Rhop. Aeth., p. 304 (1898).

*Thecla licinia* Mab., Grand., Hist. Phys., etc., de Madagascar, pl. 30a, ff. 5, 5a (1885).

Pretoria, June, September (C. J. Swierstra); id., September (Miss R. Leendertz); Shilouvane, August (H. A. Junod); Barberton (Jeffery), in Mus. Coll.; Johannesburg, Warmbaths, Crocodilepoort, and Magaliesberg (H. L. L. Feltham).

\* 111. *Deudorix dinomenes* Smith.

Ann. Mag. Nat. Hist. (5), 19, p. 65 (1887); Trimen, S. Afr. Buttl., 3, p. 391 (1889); Aurivillius, Rhop. Aeth., p. 309 (1898).

Marico River (F. C. Selous, recorded by R. Trimen).

112. *Deudorix antalus* (Hopffer).

Trimen, S. Afr. Buttl., 2, p. 107 (1887); Aurivillius, Rhop. Aeth., p. 309 (1898).

*Dipsas antalus* Hopff., Mon. K. Ak. Wiss. Berl., p. 641 (1855).

Shilouvane, April, May, August (H. A. Junod), in Mus. Coll. and H. L. L. Feltham's Collection; Johannesburg (H. L. L. Feltham); id., July (A. G. Cook); Crocodile River, south of Magaliesberg (H. L. L. Feltham); De Kroon No. 420, March, and White River, November (A. G. Cook); Komatipoort, July and August (G. W. Jeffery); Potchefstroom (Ayres); Limpopo River (Selous, teste Trimen).

## GENUS MYRINA, FABRICIUS.

Illiger's Mag., 4, p. 286 (1807); Trimen, S. Afr. Buttl., 2, p. 140 (1887); Aurivillius, Rhop. Aeth., p. 310 (1898).

113. *Myrina ficedula* Trimen.

Trans. Ent. Soc. Lond., p. 324 (1879); S. Afr. Buttl., 2, p. 141 (1887); Aurivillius, Rhop. Aeth., p. 310 (1898).

Pretoria, February (C. J. Swierstra); Johannesburg, March (A. Ross); Waterval Onder, December (Dr. H. G. Breyer and A. Ross); Lydenburg District (P. A. Krantz); Shilouvane, July, October (H. A. Junod), in Mus. Coll.; Johannesburg (H. L. L. Feltham); id., all summer (A. T. Cooke); White River (A. T. Cooke); Buffelskloof No. 704, December (A. G. Cook); Barberton, common (G. W. Jeffery).

GENUS *HYPOLYCAENA*, *FELDER*.

Wien. Ent. Mon., 4, p. 293 (1862); Trimen, S. Afr. Buttl., 2, p. 114 (1887); Aurivillius, Rhop. Aeth., p. 313 (1898).

114. *Hypolycaena philippus* (Fabricius).

Trimen, S. Afr. Buttl., 2, p. 118 (1887); Aurivillius, Rhop. Aeth., p. 316 (1898).

*Hesperia philippus* Fabr., Ent. Syst. (3), 1, p. 283 (1793).

Barberton, February, March (Miss De Beer); Shilouvane, April (H. A. Junod), in Mus. Coll.; Pretoria, April (W. L. Distant); Johannesburg, suburbs, January (A. Ochse); Warmbaths (H. L. L. Feltham); Buffelskloof, December, and Nelspruit, November (A. G. Cook); White River Settlement (H. L. L. Feltham); Barberton, common (G. W. Jeffery).

115. *Hypolycaena coeculus* (Hopffer).

Trimen, S. Afr. Buttl., 2, p. 116 (1887); Aurivillius, Rhop. Aeth., p. 316 (1898).

*Iolaus coeculus* Hopff., Monats. d. K. Ak. Wiss. Berl., p. 642 (1855).

Waterval Onder, December, 1898 (Dr. H. G. Breyer); Crocodilepoort (East), November (C. J. Swierstra); Komatipoort (Jeffery); Shilouvane, December (H. A. Junod), in Mus. Coll.

GENUS *STUGETA*, *DRUCE*.

Ann. Mag. Nat. Hist. (6), 8, p. 140, 149 (1891); Aurivillius, Rhop. Aeth., p. 317 (1898).

116. *Stugeta bowkeri* (Trimen).

Aurivillius, Rhop. Aeth., p. 317 (1898).

*Iolaus bowkeri* Trimen, Trans. Ent. Soc. Lond., (3) 2, p. 176 (1864); S. Afr. Buttl., 2, p. 132 (1887).

Yokskei River, October (A. Ross); Lydenburg District (P. A. Krantz); Barberton, January, December (Gould), in Mus. Coll.; Pretoria, January, February, and Warmbaths, December (W. L. Distant); Nelspruit, December, January (A. T. Cooke); Barberton, common (G. W. Jeffery).

GENUS *IOLAUS*, *HÜBNER*.

Verz. Bek. Schmett., p. 81 (1816); Trimen, S. Afr. Buttl., 2, p. 125 (1887); Aurivillius, Rhop. Aeth., p. 318 (1898).

117. *Iolaus silas* Westwood.

Gen. Diurn. Lep., 2, p. 481, pl. 47, f. 5 (1852); Trimen, S. Afr. Buttl., 2, p. 127 (1887); Aurivillius, Rhop. Aeth., p. 324 (1898).

Waterval Onder, December (Dr. H. G. Breyer); Shilouvane, April (H. A. Junod), in Mus. Coll.; Nelspruit (A. T. Cooke).

118. *Iolaus trimeni* Wallengren.

Ofv. K. Vet. Ak. Förh., p. 87 (1875); Trimen, S. Afr. Buttl., 2, p. 129, pl. 7, f. 4 (1887); Aurivillius, Rhop. Aeth., p. 324 (1898).

Shilouvane, December (H. A. Junod), in Mus. Coll.; Pretoria, December (W. L. Distant); Vaal River (N. Person, teste Trimen); Warmbaths (H. L. L. Feltham), id., April; Buffelskloof, December (A. G. Cook); Nelspruit, November, December (A. T. Cooke); White River Settlement (H. L. L. Feltham).

119. *Iolaus alienus* Trimen.

Trans. Ent. Soc. Lond., 1898, p. 10, pl. 1, f. 6; Aurivillius, Rhop. Aeth., p. 325 (1898).

Shilouvane, October (H. A. Junod), in Mus. Coll.

\* 120. *Iolaus ceres* (Hewitson).

Trimen, S. Afr. Buttl., 2, p. 134 (1887); Aurivillius, Rhop. Aeth., p. 326 (1898).

Myrina ceres Hew., Ill. Diurn. Lep., p. 39, pl. 17, f. 63 (1865).

Barberton (G. W. Jeffery).

\* 121. *Iolaus mimosae* Trimen.

Trans. Ent. Soc. Lond., 1874, p. 330, pl. 2, ff. 1, 2; S. Afr. Buttl., 2, p. 135 (1887); Aurivillius, Rhop. Aeth., p. 326 (1898).

Limpopo River (F. C. Selous, teste Trimen); Noord Kaap, Barberton District, October (G. W. Jeffery).

122. *Iolaus pallene* (Wallengren).

Trimen, S. Afr. Buttl., 2, p. 138 (1887); Aurivillius, Rhop. Aeth., p. 326 (1898).

Myrina pallene Willgr., Lep. Rhop. Caffr., p. 36 (1857).

Waterval Onder, December (Dr. H. G. Breyer); Barberton, February (Gould), in Mus. Coll.; Barberton, fairly common (G. W. Jeffery); Nelspruit, November, White River, November (A. G. Cook, A. T. Cooke, and H. L. L. Feltham); Warmbaths, January (A. G. Cook).

## GENUS APHNAEUS, HÜBNER.

Verz. Bek. Schmett., p. 81 (1816); part, Trimen, S. Afr. Buttl., 2, p. 146 (1887); Aurivillius, Rhop. Aeth., p. 327 (1898).

123. *Aphnaeus hutchinsoni* Trimen.

S. Afr. Buttl., 2, p. 148 (1887); Aurivillius, Rhop. Aeth., p. 328 (1898).

Shilouvane, September (H. A. Junod), in Mus. Coll.; Eureka, near Barberton (C. F. Palmer, teste Trimen).



## GENUS SPINDASIS, WALLENGREN.

Lep. Rhop. Caffr., p. 45 (1857); Aurivillius, Rhop. Aeth., p. 328 (1898).

Aphnaeus Trimen, part, S. Afr. Buttl., 2, p. 148 (1887).

124. *Spindasis phanis* (Trimen).

Aurivillius, Rhop. Aeth., p. 330 (1898).

Aphnaeus phanis Trimen, Trans. Ent. Soc. Lond., 1873, p. 111, pl. 1, ff. 4, 5; S. Afr. Buttl., 2, p. 156 (1887).

Waterberg District, November, December (R. v. Jutrzencka); Lydenburg District (P. A. Krantz); Shilouvane, September (H. A. Junod), in Mus. Coll.; Crocodile River, south of Magaliesberg, Warmbaths (H. L. L. Feltham); Buffelskloof No. 704, December, Warmbaths, January (A. G. Cook); Noord Kaap, Barberton District (G. W. Jeffery).

125. *Spindasis natalensis* (Hewitson).

Aurivillius, Rhop. Aeth., p. 331 (1898).

Amblypodia natalensis Doubl. and Hew., Gen. Diurn. Lep., pl. 75, f. 4 (1852).

Aphnaeus masilikazi Trimen, S. Afr. Buttl., 2, p. 152 (1887).

Fairly common during the summer months throughout the Transvaal.

126. *Spindasis mozambica* Bertoloni.

Aurivillius, Rhop. Aeth., p. 331 (1898).

Aphnaeus natalensis Trimen, S. Afr. Buttl., 2, p. 150 (1887).

Common during summer in suitable localities throughout the Transvaal.

127. *Spindasis ella* (Hewitson).

Aurivillius, Rhop. Aeth., p. 332 (1898).

Aphnaeus ella Hew., Ill. Diurn. Lep., p. 63, pl. 25, f. 6 (1865).

Trimen, S. Afr. Buttl., 2, p. 154 (1887).

Pretoria, December (C. J. Swierstra); Barberton, February (Gould); Waterval Onder, December (A. Ross); Bandalier Kop, September (Dr. L. Gough); Shilouvane, April and September (H. A. Junod), in Mus. Coll.; Johannesburg (A. T. Cooke and H. L. L. Feltham); Warmbaths, January (A. G. Cook); Komatipoort (G. W. Jeffery); Potchefstroom (Morrant and Ayres); Marico and Limpopo River (Selous, teste R. Trimen).

## GENUS CHLOROSELAS, BUTLER.

Proc. Zool. Soc., 1885, p. 765 (1886); Aurivillius, Rhop. Aeth., p. 333 (1898).

Aphnaeus, part, Trimen, S. Afr. Buttl., 2, p. 146 (1887).

\* 128. *Chloroselas pseudozeritis* (Trimen).

Aurivillius, Rhop. Aeth., p. 333 (1898).

Aphnaeus pseudozeritis Trimen, Trans. Ent. Soc., 1873, p. 113, pl. 1, f. 6; S. Afr. Buttl., 2, p. 160 (1887).

Warmbaths (H. L. L. Feltham).

## GENUS AXIOCERCES, HÜBNER.

Verz. Bek. Schmett., p. 71 (1816); Aurivillius, Rhop. Aeth., p. 334 (1898).

Chrysorychia Trimen, S. Afr. Buttl., 2, p. 161 (1887).

129. *Axiocerces harpax* (Fabricius).

Aurivillius, Rhop. Aeth., p. 335 (1898).

Papilio harpax F., Syst. Ent., p. 829 (1775).

Chrysorychia harpax Trimen, S. Afr. Buttl., p. 162 (1887).

Common throughout the Transvaal.

130. *Axiocerces amanga* (Westwood).

Aurivillius, Rhop. Aeth., p. 335 (1898).

Zeritis amanga Westw., in Oates' Matabeleland, etc., p. 351 (1881).

Chrysorychia amanga Trimen, S. Afr. Buttl., 2, p. 165, pl. 9, f. I (1887).

Louw's Creek, September (Dr. L. Gough); Barberton, April (Miss De Beer); Shilouvane, September (H. A. Junod), in Mus. Coll.; Pretoria, January, March (W. L. Distant); Crocodile River, south of Magaliesberg, Warmbaths (H. L. L. Feltham); Buffelskloof, December, Nelspruit, November (A. G. Cook); White River (H. L. L. Feltham); Barberton, fairly common (G. W. Jeffery).

## GENUS LEPTOMYRINA, BUTLER.

Proc. Zool. Soc., 1898, p. 405; Aurivillius, Rhop. Aeth., p. 335 (1898).

Hypolycaena (part) Trimen, S. Afr. Buttl., 2, p. 114 (1887).

\* 131. *Leptomyrina hirundo* (Wallengren).

Aurivillius, Rhop. Aeth., p. 336 (1898).

Thecla hirundo Wllgr., Lep. Rhop. Caffr., p. 35 (1857).

Hypolycaena hirundo Trimen, S. Afr. Buttl., 2, p. 121 (1887).

Barberton (G. W. Jeffery).

132. *Leptomyrina lara* (Linnaeus).

Aurivillius, Rhop. Aeth., p. 336 (1898).

Papilio lara Linn., Mus. Lud. Ulr., p. 320 (1764).

Hypolycaena lara Trimen, S. Afr. Buttl., 2, p. 123 (1887).

Common during summer in suitable localities.

## GENUS CAPYS, HEWITSON.

Ill. Diurn. Lep., p. 59 (1865); Trimen, S. Afr. Buttl., 2, p. 112 (1887); Aurivillius, Rhop. Aeth., p. 337 (1898).

133. *Capys alphaeus* (Cramer).

Trimen, S. Afr. Buttl., 2, p. 113 (1887); Aurivillius, Rhop. Aeth., p. 337 (1898).

*Papilio alphaeus* Cr., Pap. Exot., 2, p. 131, pl. 182, f. E, F (1779).

Shilouvane, March, April (H. A. Junod), in Mus. Coll., and also in H. L. L. Feltham's Coll.; Potchefstroom and Lydenburg Districts (T. Ayres, teste R. Trimen).

134. *Capys disjunctus* Trimen.

Trans. Ent. Soc. Lond., 1895, p. 190, pl. 5, ff. 5, 5a; Aurivillius, Rhop. Aeth., p. 337 (1898).

Johannesburg (A. Ross), in Mus. Coll.; also from Johannesburg (by A. G. Cook, A. T. Cooke, and H. L. L. Feltham); Barberton (R. Trimen).

## GENUS ZERITIS, WESTWOOD.

Gen. Diurn. Lep., p. 500 (1852); Trimen, S. Afr. Buttl., 2, p. 167 (1887).

Phasis, Aurivillius, Rhop. Aeth., p. 337 (1898).

\* 135. *Zeritis aethon* Trimen.

S. Afr. Buttl., 2, p. 176 (1887); Aurivillius, Rhop. Aeth., p. 340 (1898).

Lydenburg District (T. Ayres, teste R. Trimen).

\* 136. *Zeritis malagrida* (Wallengren).

Trimen, S. Afr. Buttl., 2, p. 194 (1887).

*Cygaritis malagrida* Wllgr., Lep. Rhop. Caffr., p. 43 (1857).

Phasis malagrida Aurivillius, Rhop. Aeth., p. 341 (1898).

Transvaal; no precise locality (teste R. Trimen).

137. *Zeritis aranda* (Wallengren).

Trimen, S. Afr. Buttl., 2, p. 198 (1887).

*Cygaritis aranda* Wllgr., Lep. Rhop. Caffr., p. 43 (1857).

Phasis aranda Aurivillius, Rhop. Aeth., p. 341 (1898).

Pretoria, December (Dr. H. G. Breyer); Johannesburg, September, October, November (A. Ross); Potgietersrust, November (G. H. Burn); Barberton, January (Gould); Shilouvane, September (H. A. Junod), in Mus. Coll.; Johannesburg, October, December (H. L. L. Feltham); Weltevreden, December, Muldersdrift, November (A. G. Cook); Barberton, common (G. W. Jeffery); Potchefstroom and Lydenburg Districts (Ayres, teste R. Trimen).

138. *Zeritis thyra* (Linnaeus).

Trimen, S. Afr. Buttl., 2, p. 195 (1887).

*Papilio thyra* Linn., Mus. Lud. Ulr. Reg., p. 329 (1764).

Phasis thyra Aurivillius, Rhop. Aeth., p. 342 (1898).

Shilouvane, January, May (H. A. Junod); Barberton, December (Gould), in Mus. Coll.; Johannesburg (H. L. L. Feltham); Pretoria, January, November (W. L. Distant); Lydenburg District (Ayres, teste R. Trimen).

139. *Zeritis dentatis* (Swierstra).

Ann. Transv. Mus., 1, p. 177 (1909).

Waterval Onder (Dr. G. H. Breyer), in Mus. Coll.; Johannesburg and Potchefstroom (H. L. L. Feltham).

140. *Zeritis almeida* (Felder).

Trimen, S. Afr. Buttl., 2, p. 200 (1887).

Nais almeida Feld., Verh. Zool. Bot. Gesell. Wien, 12, p. 478 (1779).

Phasis almeida Aurivillius, Rhop. Aeth., p. 342 (1898).

Pretoria District, September (C. J. Swierstra); Johannesburg. October, November (A. Ross), in Mus. Coll.; Potchefstroom (T. Ayres, teste R. Trimén); Johannesburg (H. L. L. Feltham); id., October, December (A. G. Cook); Weltevreden, October, Muldersdrift, November (A. G. Cook); Barberton (Dr. Rendall, teste W. L. Distant).

141. *Zeritis molomo* Trimén.

Trans. Ent. Soc. Lond., 1870, p. 373, pl. 6, f. 9; S. Afr. Buttl., 2, p. 205 (1887).

Phasis molomo Aurivillius, Rhop. Aeth., p. 342 (1898).

Johannesburg, October, Jukskei River, October (A. Ross); Potgietersrust, October, November (G. H. Burn), in Mus. Coll.; Johannesburg (H. L. L. Feltham); id., October, November, and Weltevreden, October (A. G. Cook); Barberton, fairly common (G. W. Jeffery).

142. *Zeritis damarensis* Trimén.

Proc. Zool. Soc. Lond., 1891, p. 90, pl. 9, f. 17.

Phasis damarensis Aurivillius, Rhop. Aeth., p. 342 (1898).

Wonderboompoort, February, Crocodilepoort (east), December (C. J. Swierstra), in Mus. Coll.

143. *Zeritis taikosama* (Wallengren).

Trimén, S. Afr. Buttl., 2, p. 203 (1887).

Cygaritis taikosama Wlgr., Lep. Rhop. Caffr., p. 43 (1857).

Phasis taikosama Aurivillius, Rhop. Aeth., p. 342 (1898).

Common throughout the Transvaal.

144. *Zeritis orthrus* Trimén.

Trans. Ent. Soc. Lond., 1874, p. 340, pl. 2, f. 10; S. Afr. Buttl., 2, p. 207 (1887).

Phasis orthrus Aurivillius, Rhop. Aeth., p. 342 (1898).

Pretoria, January, December (C. J. Swierstra and H. G. Breyer); Potgietersrust, November (G. H. Burn); Lydenburg District (P. A. Krantz), in Mus. Coll.; Warmbaths (H. L. L. Feltham); Ulundi, near Barberton (G. W. Jeffery).



145. *Zeritis leroma* (Wallengren).

Trimen, S. Afr. Buttl., 2, p. 169 (1887).

Arhopala ? leroma Wallengren, Lep. Rhop. Caffr., p. 42 (1857).

Phasis leroma Aurivillius, Rhop. Aeth., p. 343 (1898).

Fairly common during the summer in suitable localities throughout the Transvaal.

GENUS *ARRUGIA*, WALLENGREN.

Ofv. Vet. Ak. Forh., 29, p. 47 (1872); Trimen, S. Afr. Buttl., 2, p. 226 (1887); Aurivillius, Rhop. Aeth., p. 343 (1898).

\* 146. *Arrugia protumnus* (Linnaeus).

Trimen, S. Afr. Buttl., 2, p. 228 (1887); Aurivillius, Rhop. Aeth., p. 343 (1898).

Papilio protumnus Linn., Mus. Lud. Ulr. Reg., p. 340 (1764).

Kalkfontein (Morant, teste R. Trimen).

147. *Arrugia basuto* Wallengren.

Lep. Rhop. Caffr., p. 46 (1857); Trimen, S. Afr. Buttl., 2, p. 345, pl. 9, ff. 8, 8a (1887); Aurivillius, Rhop. Aeth., p. 344 (1898).

Piensaars River (R. v. Jutrencka); Waterval Onder, December (A. Ross); Barberton, February, December (Gould), in Mus. Coll.; Pretoria, December, Weltevreden, December, and Warmbaths, January (A. G. Cook); Johannesburg (H. L. L. Feltham); Barberton, common (G. W. Jeffery); Middelburg, November (W. L. Distant); Potchefstroom District (T. Ayres, teste R. Trimen).

GENUS *LYCAENESTHES*, MOORE.

Proc. Zool. Soc. Lond., 1865, p. 773 (1866); Trimen, S. Afr. Buttl., 2, p. 93 (1887); Aurivillius, Rhop. Aeth., p. 345 (1898).

148. *Lycaenesthes amarah* (Guérin).

Trimen, S. Afr. Buttl., 2, p. 94 (1887); Aurivillius, Rhop. Aeth., p. 347 (1898).

Polyomatus amarah Guér., Lefebv. Voy. Abyss, 6, p. 384, pl. 11, ff. 5, 6 (1847).

Throughout the Transvaal.

149. *Lycaenesthes ? minima* Trimen.

Trans. Ent. Soc., 1893, p. 135, pl. 8, f. 10; Auriv., Rhop. Aeth., p. 347 (1898).

Witpoortje, September (A. Ross), in Mus. Coll.

\* 150. *Lycaenesthes otacilia* (Trimen).

S. Afr. Buttl., 2, p. 102, pl. 7, ff. 7, 8 (1887); Aurivillius, Rhop. Aeth., p. 348 (1898).

Lycaena otacilia Trimen, Trans. Ent. Soc., 1868, p. 90.

Fountains, Pretoria District, Crocodile River, south of Magaliesberg (H. L. L. Feltham); Warmbaths, April (A. G. Cook).

\* 151. *Lycaenesthes neglecta* Trimen.

Trans. Ent. Soc., 1891, p. 175; 1893, p. 132, pl. 8, ff. 7, 8; Aurivillius, Rhop. Aeth., p. 348 (1898).

Johannesburg and White River (H. L. L. Feltham).

152. *Lycaenesthes livida* Trimen.

Trans. Ent. Soc. Lond., 1881, p. 443; S. Afr. Buttl., 2, p. 103, pl. 7, ff. 7, 7a (1887); Aurivillius, Rhop. Aeth., p. 348 (1898).

Fountain Grove, Pretoria District (C. J. Swierstra); Johannesburg, November, April (A. Ross); Shilouvane, April (H. A. Junod), in Mus. Coll.; Buffelskloof, December (A. G. Cook); Warmbaths (H. L. L. Feltham).

153. *Lycaenesthes liodes* Hewitson.

Trans. Ent. Soc., 1874, p. 349; Trimen, S. Afr. Buttl., 2, p. 100 (1887); Aurivillius, Rhop. Aeth., p. 348 (1898).

Throughout the Transvaal, but not everywhere common.

## GENUS LYCAENA, FABRICIUS.

Ill. Mag., 6, p. 285 (1807); Trimen, S. Afr. Buttl., 2, p. 11 (1887).

Cupido Aurivillius, Rhop. Aeth., p. 353 (1898).

154. *Lycaena nubifer* Trimen.

Trans. Ent. Soc. Lond., 1895, p. 187, pl. 5, ff. 4, 4a.

Cupido nubifer Aurivillius, Rhop. Aeth., p. 359 (1898).

Fountain Grove, Pretoria District, October, November (C. J. Swierstra); Johannesburg, November; Waterval Onder, December (A. Ross); Barberton, December (Gould), in Mus. Coll.; Yokskei River (H. L. L. Feltham).

155. *Lycaena lingus* (Cramer).

Trimen, S. Afr. Buttl., 2, p. 66 (1887).

Papilio lingus Cr., Pap. Exot., 4, p. 176, pl. 379, ff. F, G (1781).

Cupido lingus Aurivillius, Rhop. Aeth., p. 360 (1898).

Throughout the Transvaal during the summer.

156. *Lycaena palemon* (Cramer).

Trimen, S. Afr. Buttl., 2, p. 67 (1887).

Papilio palemon Cr., Pap. Exot., 4, p. 209, pl. 390, ff. E, F (1782).

Johannesburg, December (A. Ross); Waterval Boven, December (Dr. H. G. Breyer); Barberton, January (Gould), in Mus. Coll.; Lydenburg District (T. Ayres, teste Trimen); Pretoria, May, October, December (W. L. Distant); Barberton (G. W. Jeffery); Johannesburg, January, May, December (A. G. Cook); White River (A. T. Cooke).

\* 157. *Lycaena marshalli* (Butler).

Cacyreus marshalli Butl., Proc. Zool. Soc., 1897, p. 845, pl. 50, f. 5 (1898).

Cupido marshalli Aurivillius, Rhop. Aeth., p. 361 (1898).

Johannesburg (H. L. L. Feltham); Barberton (G. W. Jeffery).

158. *Lycaena sybaris* Hopffer.

Monatsb. K. Preuss. Ak. Wissensch., 1855, p. 642; Trimen, S. Afr. Buttl., 2, p. 85 (1887).

Cupido sybaris Aur., Rhop. Aeth., p. 362 (1898).

Throughout the Transvaal; fairly common during summer months.

159. *Lycaena hintza* Trimen.

Trans. Ent. Soc. Lond. (3), 2, p. 177 (1864); S. Afr. Buttl., 2, p. 79, pl. 8, ff. 1, 1a (1887).

Cupido hintza Aur., Rhop. Aeth., p. 363 (1898).

Throughout the Transvaal. Common during summer.

160. *Lycaena calice* Hopffer.

Mon. K. Preuss. Ak. Wissensch., 1855, p. 642; Trimen, S. Afr. Buttl., 2, p. 80 (1887).

Cupido calice Aur., Rhop. Aeth., p. 363 (1898).

Lydenburg District (P. A. Krantz); Barberton, December (Gould), in Mus. Coll.; Fountain Grove, Pretoria District, and Warmbaths (H. L. L. Feltham).

161. *Lycaena melaena* Trimen.

S. Afr. Buttl., 2, p. 82 (1887).

Cupido melaena Aur., Rhop. Aeth., p. 363 (1887).

Rooiplaas, Pretoria District, March (C. J. Swierstra); Malalane, February, and Barberton, December (Gould), in Mus. Coll.; Pretoria District, Warmbaths, White River (H. L. L. Feltham); De Kroon No. 420, March; Warmbaths, January, Buffelskloof, December, and Nelspruit, November (A. G. Cook); Komatipoort, August (G. W. Jeffery).

162. *Lycaena telicanus* (Lang).

Trimen, S. Afr. Buttl., 2, p. 69 (1887).

Papilio telicanus Lang. Verz. sein. Schmett., 2, p. 47 (1789).

Cupido telicanus plinius Auriv., Rhop. Aeth., p. 364 (1898).

Throughout the Transvaal. Common.

163. *Lycaena natalensis* Trimen.

S. Afr. Buttl., 2, p. 77 (1887).

Cupido sigillatus Auriv., Rhop. Aeth., p. 366 (1898).

Crocodilepoort East, November (C. J. Swierstra), in Mus. Coll.; Barberton District, common (G. W. Jeffery); White River, November (A. T. Cooke); Fountain Grove, Pretoria District, and Johannesburg (H. L. L. Feltham).

164. *Lycaena moriqua* Wallengren.

Lep. Rhop. Caffr., p. 39 (1857); Trimen, S. Afr. Buttl., 2, p. 75, pl. 8, ff. 5, 5a (1887).

Cupido moriqua Auriv., Rhop. Aeth., p. 366 (1898).

Waterval Onder, January (A. Ross); Pretoria, February (C. J. Swierstra), in Mus. Coll.; Johannesburg (H. L. L. Feltham); id., January, November, Weltevreden, January, Buffelskloof, December, and Warmbaths, January (A. G. Cook); Barberton, January (G. W. Jeffery).

165. *Lycaena mirza* Plötz.

S.E.Z., 41, p. 203 (1880).

*Lycaena moriqua* var. Trimen, S. Afr. Buttl., 2, p. 76 (1887).

Cupido mirza Auriv., Rhop. Aeth., p. 366 (1898).

Barberton, December (Gould), in Mus. Collection.

166. *Lycaena jesous* (Guérin).

Trimen, S. Afr. Buttl., 2, p. 72 (1887).

Polyommatus jesous Guér., Lefebv. Voy. Abyss., 4, p. 383, pl. 11, ff. 3, 4 (1847).

Cupido jesous Auriv., Rhop. Aeth., p. 366 (1898).

Common throughout the Transvaal.

167. *Lycaena zena* Moore.

Proc. Zool. Soc. Lond., 1865, p. 505, pl. 31, f. 9.

*Lycaena macalenga* Trimen, Trans. Ent. Soc., 1870, p. 364, pl. 6, ff. 5, 6; S. Afr. Buttl., 2, p. 74 (1887).

Cupido zena Auriv., Rhop. Aeth., p. 366 (1898).

Klip River, near Johannesburg, December (A. Ross), in Mus. Coll.; Warmbaths, December, Zoutpansberg, May (W. L. Distant); Johannesburg, rare (H. L. L. Feltham); Weltevreden, January, Buffelskloof, December (A. G. Cook).

168. *Lycaena sichelia* Wallengren.

Lep. Rhop. Caffr., p. 37 (1857); Trimen, S. Afr. Buttl., 2, p. 61 (1887).

Cupido sichelia Auriv., Rhop. Aeth., p. 367 (1898).

Waterval Onder, December (Dr. H. G. Breyer); Barberton, December (Gould), in Mus. Coll.; Johannesburg, White River, and Nelspruit (H. L. L. Feltham); Weltevreden, December, Buffelskloof, December, and White River, November (A. G. Cook).

169. *Lycaena baetica* (Linnaeus).

Trimen, S. Afr. Buttl., 2, p. 58 (1887).

*Papilio baeticus* Linn., Syst. Nat., ed. 12, p. 789 (1767).

Cupido baeticus Auriv., Rhop. Aeth., p. 367 (1898).

Common throughout the Transvaal.



\* 170. *Lycaena notobia* Trimen.

Trans. Ent. Soc. Lond., 1868, p. 91; S. Afr. Buttl., 2, p. 62, pl. 8, ff. 6, 6a (1887).

Cupido notobia Auriv., Rhop. Aeth., p. 368 (1898).

Potchefstroom (T. Ayres, teste R. Trimen).

\* 171. *Lycaena barberae* Trimen.

Trans. Ent. Soc. Lond., 1868, p. 89, pl. 5, f. 7; S. Afr. Buttl., 2, p. 56 (1887).

Cupido barberae Auriv., Rhop. Aeth., p. 369 (1898).

Warmbaths, April (A. G. Cook and H. L. L. Feltham); Barberton District (G. W. Jeffery).

\* 172. *Lycaena methymna* Trimen.

Trans. Ent. Soc. Lond. (3), 1, p. 280 (1862); S. Afr. Buttl., 2, p. 27 (1887).

Cupido methymna Auriv., Rhop. Aeth., p. 373 (1898).

Weltevreden, October (A. G. Cook).

173. *Lycaena puncticillia* Trimen.

Trans. Ent. Soc. Lond., 1883, p. 350; S. Afr. Buttl., 2, p. 29, pl. 8, f. 4 (1887).

Cupido puncticillia Auriv., Rhop. Aeth., p. 373 (1898).

Klip River, Johannesburg, October, November (A. Ross), in Mus. Coll.

\* 174. *Lycaena hypopolia* Trimen.

S. Afr. Buttl., 2, p. 30 (1877).

Cupido hypopolia Auriv., Rhop. Aeth., p. 373 (1898).

Johannesburg, one example (H. L. L. Feltham); Weltevreden, October (A. G. Cook).

175. *Lycaena asopus* Hopffer.

Monatsb. K. Preuss. Akad. Wiss., p. 642 (1855); Peter's Reise Mossamb. Ins., p. 409, pl. 26, ff. 13-15 (1862).

Cupido malathana Auriv., Rhop. Aeth., p. 373 (1898).

Fairly common during the summer.

176. *Lycaena dolorosa* Trimen.

S. Afr. Buttl., 2, p. 41 (1887).

Cupido dolorosus Auriv., Rhop. Aeth., p. 373 (1898).

Fairly common from September to February in suitable localities.

\* 177. *Lycaena procerca* Trimen.

Trans. Ent. Soc., 1893, p. 125, pl. 8, ff. 3, 4.

Cupido procerus Auriv., Rhop. Aeth., p. 374 (1898).

White River, November (A. G. Cook and H. L. L. Feltham).

178. *Lycaena osiris* Hopffer.

Monatsb. K. Preuss, Akad. Wiss., 1855, p. 642.

Peter's Reise Mossamb. Ins., p. 409, pl. 26, ff. 11, 12 (1862).

Trimen, S. Afr. Buttl., p. 15, male, non-female (1887); Trans. Ent. Soc. Lond., 1893, p. 127.

Cupido osiris Auriv. Rhop. Aeth., p. 374 (1898).

Shilouvane (H. A. Junod); Lydenburg District (P. A. Krantz), in Mus. Coll.; Fountain Grove, Pretoria District, Johannesburg, and Shilouvane, per H. A. Junod (H. L. L. Feltham); Warmbaths, December (W. L. Distant); Barberton District (G. W. Jeffery); White River (A. T. Cooke).

\* 179. *Lycaena barkeri* Trimen.

Trans. Ent. Soc. Lond., 1893, p. 129, pl. 8, ff. 5, 6.

Cupido barkeri Auriv., Rhop. Aeth., p. 374 (1898).

Lydenburg District (T. Ayres, teste R. Trimen); Komatipoort, July (G. W. Jeffery).

180. *Lycaena patricia* Trimen.

S. Afr. Buttl., 2, p. 20 (1887).

Cupido patricia Auriv., Rhop. Aeth., p. 374 (1898).

Common in suitable localities during summer months.

181. *Lycaena glauca* Trimen.

S. Afr. Buttl., 2, p. 21 (1887).

Cupido glauca Auriv., Rhop. Aeth., p. 375 (1898).

Waterberg District (R. v. Jutrencha); Rustenburg and Lydenburg Districts (P. A. Krantz); Waterval Onder, January (A. Ross), in Mus. Coll.; Pretoria, October, December (W. L. Distant); Marico and Limpopo River (Selous); Potchefstroom District (Ayres, teste Trimen); Buffelskloof, December (A. G. Cook); Venterskroon, White River (H. L. L. Feltham).

182. *Lycaena celaeus* (Cramer).

Papilio celaeus Cr., Pap. Exot., 4, p. 177, pl. 379, ff. K, K (1782).

*Lycaena parsimon* Trim., S. Afr. Buttl., 2, p. 18 (1887).

Cupido celaeus Auriv., Rhop. Aeth., p. 375 (1898).

Johannesburg, December (A. Ross); Rustenburg District (P. A. Krantz); Shilouvane, January, May, November (H. A. Junod), in Mus. Coll.; Pretoria, December (W. L. Distant), id., December; Johannesburg, February, December, and White River, November (A. G. Cook); Venterskroon, Johannesburg south (H. L. L. Feltham); Potchefstroom (Morant and Ayres, teste R. Trimen).

183. *Lycaena jefferyi* Swierstra.

Ann. Trans. Museum, p. 176 (1909).

Ulundi, October, and Noord Kaap, Barberton District (G. W. Jeffery).

184. *Lycaena mahallokoaena* Wallengren.

Lep. Rhop. Caffr., p. 41 (1857); Trimen, S. Afr. Buttfl., 2, p. 44 (1887); Trans. Ent. Soc. Lond., 1870, p. 366, pl. 4, ff. 7, 8.  
 Cupido mahallokoaena Auriv., Rhop. Aeth., p. 376 (1898).  
 Common throughout Transvaal.

185. *Lycaena trochilus* Freyer.

Neuere Beitr. Schmett., 5, p. 98, pl. 440, f. 1 (1844).  
 Trimen, S. Afr. Buttfl., 2, p. 52 (1887).  
 Cupido trochilus Auriv., Rhop. Aeth., p. 376 (1898).  
 Fairly common.

186. *Lycaena ignota* Trimen.

S. Afr. Buttfl., 2, p. 39 (1887).  
 Cupido ignotus Auriv., Rhop. Aeth., p. 376 (1898).  
 Klip River, October (A. Ross); Potgietersrust, November (G. H. Burn), in Mus. Coll.; Johannesburg (H. L. L. Feltham); Weltevreden, October, Muldersdrift, November (A. G. Cook); Ulundi, Barberton District (G. W. Jeffery); Potchefstroom and Lydenburg District (T. Ayres, teste R. Trimen).

\* 187. *Lycaena tantalus* Trimen.

S. Afr. Buttfl., 2, p. 38 (1887).  
 Cupido tantalus Auriv., Rhop. Aeth., p. 376 (1898).  
 Barberton (G. W. Jeffery); Johannesburg (A. T. Cooke, teste H. L. L. Feltham).

188. *Lycaena hippocrates* (Fabricius).

Trimen, S. Afr. Buttfl., 2, p. 35 (1887).  
 Hesperia hippocrates F., Ent. Syst., 3, p. 288 (1793).  
 Cupido hippocrates Auriv., Rhop. Aeth., p. 376 (1898).  
 Shilouvane, August (H. A. Junod), in Mus. Coll.; White River, November (A. G. Cook); id., December, January (A. T. Cooke); Nelspruit (H. L. L. Feltham); id., November (A. G. Cook); Barberton, fairly common (G. W. Jeffery).

189. *Lycaena cissus* (Godart).

Trimen, S. Afr. Buttfl., 2, p. 31 (1887).  
 Polyommatus cissus God., Enc. Meth., 9, p. 683 (1819).  
 Cupido cissus Auriv., Rhop. Aeth., p. 377 (1898).  
 Common throughout the Transvaal, October to April.

190. *Lycaena iobates* Hopffer.

Monatsb. K. Preuss. Ak. Wissensch., 1855, p. 642; Peter's Reise Mossamb. Ins., p. 408, pl. 26, ff. 9, 10 (1862).  
 Trimen, S. Afr. Buttfl., 2, p. 33 (1887).  
 Cupido iobates Auriv., Rhop. Aeth., p. 377 (1898).

Komatipoort (Jeffery), in Mus. Coll.; Johannesburg (H. L. L. Feltham and A. T. Cooke); Crocodile River, south of Magaliesberg (H. L. L. Feltham); Weltevreden, March, and De Kroon, March (A. G. Cook); Potchefstroom District (T. Ayres, teste R. Trimen); Barberton District, common (G. W. Jeffery).

191. *Lycaena niobe* Trimen.

Trans. Ent. Soc. Lond., (3) 1, p. 282 (1862); S. Afr. Buttl., 2, p. 36 (1887).

Cupido niobe Auriv., Rhop. Aeth., p. 378 (1898).

Eastern Transvaal (G. W. Jeffery), in Mus. Coll.; Potchefstroom (T. Ayres, teste R. Trimen); White River (H. L. L. Feltham); Barberton, fairly common (G. W. Jeffery).

192. *Lycaena antanossa* Mabille.

Ann. Ent. France, (5) 7, Bull., p. 72 (1877); Trimen, Trans. Ent. Soc., 1891, p. 173.

Cupido antanossa Auriv., Rhop. Aeth., p. 378 (1898).

Waterval Onder, April (A. Ross); Barberton, December (Gould), in Mus. Coll.

193. *Lycaena gaika* Trimen.

Trans. Ent. Soc., (3) 1, p. 403 (1862); S. Afr. Buttl., 2, p. 50 (1887).

Cupido gaika Auriv., Rhop. Aeth., p. 378 (1898).

Generally distributed over the Transvaal, but does not seem to occur very plentiful.

194. *Lycaena lysimon* Hübner.

Trimen, S. Afr. Buttl., 2, p. 45 (1887).

Papilio lysimon Hübn., Samml. Europ. Schmett., ff. 534-35 (1798-1803).

Cupido lysimon Auriv., Rhop. Aeth., p. 379 (1898).

All over the Transvaal, in some places very common.

195. *Lycaena lucida* Trimen.

Trans. Ent. Soc. Lond., 1883, p. 348; S. Afr. Buttl., 2, p. 47 (1887).

Cupido lucida Auriv., Rhop. Aeth., p. 379 (1898).

An abundant species all over the Transvaal.

GENUS HEODES, DALMAN.

Vetensk. Akad. Handl., 37, p. 63, 91 (1816); Auriv. Rhop. Aeth., p. 382 (1898).

Chrysophanus Trimen, S. Afr. Buttl., 2, p. 90 (1887).



196. *Heodes orus* (Cramer).

Auriv., Rhop. Aeth., p. 383 (1898).

Papilio orus Cr., Pap. Exot., 4, p. 84, pl. 332, ff. E, F (1780).

Chrysophanus orus Trimen, S. Afr. Buttl., 2, p. 91 (1887).

Pretoria, January, May (C. J. Swierstra); Johannesburg, October, November (A. Ross), in Mus. Coll.; Johannesburg (H. L. L. Feltham); id., January, March, December, and Pretoria, August (A. G. Cook); Potchefstroom District (T. Ayres, teste R. Trimen).

## FAMILY PIERIDAE.

GENUS PONTIA, *BOISDUVAL*.

Spec. Gen. Lep. 1, p. 430 (1836); Trimen, S. Afr. Buttl., 3, p. 7 (1889).

Leptosia Auriv., Rhop. Aeth., p. 386 (1898).

197. *Pontia alcesta* (Cramer).

Trimen, S. Afr. Buttl., 3, p. 8 (1889).

Papilio alcesta Cram., Pap. Exot., 4, p. 175, pl. 379, f. A (1781).

Leptosia alcesta Auriv., Rhop. Aeth., p. 387 (1898).

Lydenburg District (P. A. Krantz); Shilouvane, July (H. A. Junod), in Mus. Coll.

GENUS HERPAENIA, *BUTLER*.

Cist. Ent., 1, p. 52 (1872); Trimen, S. Afr. Buttl., 3, p. 76 (1889); Auriv., Rhop. Aeth., p. 388 (1898).

198. *Herpaenia eriphia* (Godart).

Trimen, S. Afr. Buttl., 3, p. 77 (1889); Auriv., Rhop. Aeth., p. 389 (1898).

Pieris eriphia God., Enc. Meth., 9, p. 157 (1819).

Fairly common throughout the Transvaal during summer months.

199. *Herpaenia eriphia nyassae* Lang.

Iris, 9, p. 123 (1896); Auriv., Rhop. Aeth., p. 389 (1898).

Herpaenia eriphia var. A. Trimen, S. Afr. Buttl., 3, p. 78 (1889).

Lydenburg District (P. A. Krantz); Wonderboompoort, July (Mrs. C. J. Swierstra), in Mus. Coll.

GENUS MYLOTHRIS, *BUTLER*.

Cist. Ent., 1, p. 42 (1870); Trimen, S. Afr. Buttl., 3, p. 28 (1889); Auriv., Rhop. Aeth., p. 389 (1898).

200. *Mylothris agathina* (Cramer).

Trimen, S. Afr. Buttl., 3, p. 30 (1889); Auriv., Rhop. Aeth., p. 394 (1898).

*Papilio agathina* Cr., Pap. Exot., 3, p. 76, pl. 237, f. D, E (1779).

All over the Transvaal, but seems only to be common in suitable localities; for instance, near very sheltered kloofs.

201. *Mylothris rüppeli* (Koch).

Trimen, S. Afr. Buttl., 3, p. 34, pl. 10, ff. 3, 3a (1889).

Aurivillius, Rhop. Aeth., p. 394 (1898).

*Pieris rüppeli* Koch, Indo-Austr. Lep. Faune, p. 88 (1865).

Shilouvane, March (H. A. Junod), in Mus. Coll. Also one specimen from the same locality and collector in H. L. L. Feltham's collection. Barberton, fairly common (G. W. Jeffery).

GENUS *APPIAS*, *HÜBNER*.

Verz., p. 91 (1862); Auriv., Rhop. Aeth., p. 396 (1898).

*Pieris*, part, Trimen, S. Afr. Buttl., 3, p. 37 (1889).

\* 202. *Appias epaphia* (Cramer).

Aurivillius, Rhop. Aeth., p. 399 (1898).

*Papilio epaphia* Cr., Pap. Exot., 3, p. 26, pl. 207, ff. D, E (1779).

*Pieris saba* Trim., S. Afr. Buttl., 3, p. 40 (1889).

Eureka District (teste, W. L. Distant).

GENUS *PIERIS*, *SCHRANK*.

Fauna Boica, 2, 1, p. 152 (1801); part, Trimen, S. Afr. Buttl., 3, p. 37 (1889); Auriv., Rhop. Aeth., p. 400 (1898).

203. *Pieris gidica* Godart.

Enc. Meth., 9, p. 131 (1819); Trimen, S. Afr. Buttl., 3, p. 64, pl. 11, f. 1 (1889); Auriv., Rhop. Aeth., p. 406 (1898).

Waterval Onder, December (A. Ross); Komatipoort, December (Dr. H. G. Breyer), in Mus. Coll.; Johannesburg, March (A. Ochse); Nelspruit, December (H. L. L. Feltham); Eureka District (W. L. Distant); Barberton (G. W. Jeffery).

204. *Pieris gidica abyssinica* Lucas.

Auriv., Rhop. Aeth., p. 406 (1898).

*Pieris abyssinica* Luc., Rev. et. Mag. Zool. (2), 4, p. 328 (1852); Trimen, S. Afr. Buttl., 3, p. 66 (1889).

Blyde River, Lydenburg District, September (P. A. Krantz), in Mus. Coll.; Barberton (G. W. Jeffery).

205. *Pieris severina* (Cramer).

Trimen, S. Afr. Buttl., 3, p. 68 (1889); Auriv., Rhop. Aeth., p. 406 (1898).

*Papilio severina* Cr., Pap. Exot., 4, p. 95, pl. 338, ff. G, H (1781).

Common in almost every part of the Transvaal.

206. *Pieris mesentina* (Cramer).

Trimen, S. Afr. Buttl., 3, p. 59 (1889); Auriv., Rhop. Aeth., p. 407 (1898).

*Papilio mesentina* Cr., Pap. Exot., 3, p. 140, pl. 270, ff. A, B (1780).

Common generally.

207. *Pieris zochalia* Boisduval.

Spec. Gen. Lep., 1, p. 506 (1836); Trimen, S. Afr. Buttl., 3, p. 57 (1889); Auriv., Rhop. Aeth., p. 408 (1898).

Although generally distributed, it does not seem to occur where trees are absent, preferring the so-called "broken veld."

208. *Pieris thyra* Hopffer.

Mon. K. Ak. Wiss. Berl., 1855, p. 639; Trimen, S. Afr. Buttl., 3, p. 44 (1889); Auriv., Rhop. Aeth., p. 409 (1898).

Krabbefontein, December (Dr. H. G. Breyer), in Mus. Coll.; Barberton (G. W. Jeffery).

209. *Pieris pigea* Boisduval.

Spec. Gen. Lep., 1, p. 523 (1836); Trimen, S. Afr. Buttl., 3, p. 46, pl. 10, ff. 5, 5a (1889); Auriv., Rhop. Aeth., p. 412 (1898).

Barberton, April (Miss L. de Beer); id., November (Gould); Louw's Creek, September (Dr. L. Gough), in Mus. Coll.; Potchefstroom District (T. Ayres, teste R. Trimen); Noordkaap, December (G. W. Jeffery).

210. *Pieris pigea alba* Wallengren.

Auriv., Rhop. Aeth., p. 412 (1898).

*Pinacopteryx alba* Wallgr., Lep. Rhop. Caffr., p. 10 (1857).

*Pieris alba* Trimen, S. Afr. Buttl., 3, p. 48 (1889).

Shilouvane, July (H. A. Junod), in Mus. Coll.

211. *Pieris simana* Hopffer.

Mon. K. Ak. Wiss. Berl., 1855, p. 640; Trimen, S. Afr. Buttl., 3, p. 50 (1889); Auriv., Rhop. Aeth., p. 412 (1898).

Barberton, December (Gould).

212. *Pieris hellica* Linnaeus.

Trimen, S. Afr. Buttl., 3, p. 73 (1889).

*Papilio hellica* L., Syst. Nat., 1, 2, p. 760 (1767).

*Pieris hellica* Auriv., Rhop. Aeth., p. 414 (1898).

Common everywhere.

## GENUS TERACOLUS, SWAINSON

Zool. Illustr., (2) 3, text to pl. 115 (1833); Trimen, S. Afr. Buttl., 3, p. 80 (1889); Aurivillius, Rhop. Aeth., p. 415 (1898).

213. *Teracolus amatus calais* (Cramer).

Auriv., Rhop. Aeth., p. 422 (1898).

Papilio calais Cr., Pap. Exot., 1, p. 84, pl. 53, ff. C, D (1775).

Komatipoort, December (Dr. H. G. Breyer), in Mus. Coll.

214. *Teracolus vesta mutans* Butler.

Auriv., Rhop. Aeth., p. 425 (1898).

*Teracolus mutans* Butl., Ann. Mag. Nat. Hist., (4) 19, p. 459 (1877).

*Teracolus vesta* Trimen, S. Afr. Buttl., 3, p. 160 (1889).

Shilouvane (H. A. Junod); Barberton, December (Gould); id., April (Miss L. de Beer); Crocodile Poort, east, November (C. J. Swierstra), in Mus. Coll.; Nelspruit, October (A. T. Cooke); id., November (A. G. Cook); id., December (H. L. L. Feltham).

215. *Teracolus vesta argillaceus* Butler.

Auriv., Rhop. Aeth., 1898, p. 425.

*Teracolus argillaceus* Butl., Ann. Mag. Nat. Hist., 4 (19), p. 459 (1877); Trimen, S. Afr. Buttl., 3, p. 161 (1889).

Blyde River, Lydenburg District, September (P. A. Krantz); Potgietersrust, November (G. H. Burn); Shilouvane, May (H. A. Junod), in Mus. Coll.

216. *Teracolus celimene* (Lucas).

Trimen, S. Afr. Buttl., 3, p. 157 (1889); Auriv., Rhop. Aeth., p. 427 (1898).

*Anthocharis celimene* Luc., Rev. et Mag. Zool., (2) 4, p. 426 (1852).

Lydenburg District (P. A. Krantz), in Mus. Coll.; Limpopo River and Marico River (Selous, teste R. Trimen); Pretoria, November (W. L. Distant).

217. *Teracolus eris* (Klug).

Trimen, S. Afr. Buttl., 3, p. 93 (1889); Aurivillius, Rhop. Aeth., p. 427 (1898).

*Pontia eris* Kl., Synb. Phys., pl. 6, ff. 15, 16 (1829).

Recorded from most parts of the Transvaal, but only common in the warmer parts.

218. *Teracolus erone jobina* Butler.

Auriv., Rhop. Aeth., p. 428 (1898).

*Euchloë jobina* Butl., Cist. Ent., 1, p. 14 (1869).

*Teracolus jobina* Trimen, S. Afr. Buttl., 3, p. 107 (1889).

Lydenburg District (P. A. Krantz), in Mus. Coll.



219. *Teracolus ione difficilis* Sharpe.

*Teracolus difficilis* Sharpe, Monogr. of the Gen. *Teracolus*, p. 58 (1900).

Shilouvane, December (H. A. Junod), in Mus. Coll.

220. *Teracolus ione phlegyas* Butler..

Auriv., Rhop. Aeth., p. 429 (1898).

*Anthocharis phlegyas* Butl., Proc. Zool. Soc. Lond., 1865, p. 431, pl. 25, ff. 3, 3a.

*Teracolus phlegyas* Trimen, S. Afr. Buttfl., 3, p. 109 (1889).

Komatipoort, December (Dr. H. G. Breyer), id. (G. W. Jeffery); Barberton, January (Gould); Waterberg District, January, February (R. v. Jutrencha), in Mus. Coll.

221. *Teracolus regina* (Trimen).

S. Afr. Buttfl., 3, p. 111 (1889); Auriv., Rhop. Aeth., p. 430 (1898).

*Anthocharis regina* Trim., Tr. Ent. Soc. Lond., (3) 1, p. 520 (1865).

Lydenburg District and Rustenburg District (P. A. Krantz), in Mus. Coll.; Marico and Limpopo Rivers (Selous and Erickson); Lydenburg District (T. Ayres, teste R. Trimen); Warmbaths (H. L. L. Feltham); White River (A. T. Cooke); Komatipoort (G. W. Jeffery).

222. *Teracolus annae* (Wallengren).

Trimen, S. Afr. Buttfl., 3, p. 114 (1889); Auriv., Rhop. Aeth., p. 431 (1898).

*Thestias annae* Wllgr., Lep. Rhop. Caffr., p. 16 (1857).

Lydenburg District (P. A. Krantz); Barberton, December (Gould), in Mus. Coll.; Johannesburg (A. T. Cooke); Venterskroon, Shilouvane, and White River Settlement (H. L. L. Feltham); Limpopo River and Marico River (Selous and Erickson, teste R. Trimen).

223. *Teracolus annae wallengreni* Butler.

Auriv., Rhop. Aeth., p. 431 (1898).

*Teracolus wallengrenii* Butl., Proc. Zool. Soc., 1876, p. 157; Trimen, S. Afr. Buttfl., 3, p. 118 (1889).

Komatipoort (G. W. Jeffery), in Mus. Coll.; Marico River (Selous); Lydenburg District (T. Ayres, teste R. Trimen); Barberton (Gould); Shilouvane, per H. A. Junod (H. L. L. Feltham).

224. *Teracolus omphale* (Godart).

Trimen, S. Afr. Buttfl., 3, p. 142 (1889); Auriv., Rhop. Aeth., p. 433 (1898).

*Pieris omphale* Godt., Enc. Meth., 9, p. 122 (1819).

Johannesburg, February (A. Ross); Crocodilepoort East, November (C. J. Swierstra); Barberton, February (Miss L. de Beer); id., December, and Malalane, February (Gould), in Mus. Coll.; Johannesburg, February, December (A. G. Cook), id., not plentiful; Crocodile River, south of the Magaliesberg, Warmbaths, and White River Settlement (H. L. L. Feltham); White River (A. T. Cooke).

225. *Teracolus omphale omphaloides* Butler.

Auriv., Rhop. Aeth., p. 434 (1898).

*Teracolus omphaloides* Butl., Proc. Zool. Soc., 1876, p. 151 (1876).

*Teracolus omphale* var. A. Trimen, S. Afr. Buttl., 3, p. 144 (1889).

Johannesburg, May (A. Ross).

226. *Teracolus omphale theogone* (Boisduval).

Auriv., Rhop. Aeth., p. 434 (1898).

*Anthocharis theogone* Bsd., Sp. Gen. Lep., p. 575 (1836).

*Teracolus theogone* Trimen, S. Afr. Buttl., 3, p. 145 (1889).

Pretoria (Dr. H. G. Breyer); Lydenburg District (P. A. Krantz); Shilouvane, August (H. A. Junod), in Mus. Coll.; Johannesburg, April, May (A. G. Cook); Potchefstroom and Lydenburg District (T. Ayres) and Barberton (Cloete, teste Trimen).

227. *Teracolus achine* (Cramer).

Trimen, S. Afr. Buttl., 3, p. 131 (1889); Auriv., Rhop. Aeth., p. 436 (1898).

*Papilio achine* Cram., Pap. Exot., 4, p. 94, pl. 338, ff. E. F.

Fairly common all over the Transvaal.

228. *Teracolus achine gavis* (Wallengren).

Auriv., Rhop. Aeth., p. 436 (1898).

*Anthocharis gavis* Wllgr., Lep. Rhop. Caffr., p. 13 (1857).

*Teracolus gavis* Trimen, S. Afr. Buttl., 3, p. 134 (1889).

Lydenburg District (P. A. Krantz); Malalane, February, and Barberton, December (Gould); Krabbefontein, December (Dr. H. G. Breyer), in Mus. Coll.; Johannesburg, February (A. Ochse); White River Settlement (H. L. L. Feltham); Limpopo River and Marico River (Erickson, teste R. Trimen).

229. *Teracolus ithonus* Butler.

Auriv., Rhop. Aeth., p. 437 (1898).

*Teracolus ithonus* Butl., Proc. Zool. Soc., 1876, p. 146, pl. 6, f. 8.

Lydenburg District, 1896 (P. A. Krantz); Pienaars River (R. v. Jutrencha), in Mus. Coll.

230. *Teracolus simplex* Butler.

Proc. Zool. Soc., 1876, p. 148; Auriv., Rhop. Aeth., p. 437 (1898); Trimen, S. Afr. Buttl., 3, p. 130 (1889).

Louw's Creek, September (Dr. L. Gough); Shilouvane, September (H. A. Junod); Johannesburg, August (A. Ross), in Mus. Coll.; Warmbaths (H. L. L. Feltham).

231. *Teracolus evenina* (Wallengren).

Trimen, S. Afr. Buttl., 3, p. 126 (1889); Auriv., Rhop. Aeth., p. 438 (1898).

*Anthopsyche evenina* Wllgr., Lep. Rhop. Caffr., p. 12 (1857).

Fairly common throughout the Transvaal.

232. *Teracolus evenina deidamioides* (Aurivillius).

Auriv., Rhop. Aeth., p. 438 (1898).

Callosune deidamioides Auriv., K. Sv. Vet. Akad.

Forhandl, 1879, p. 45.

*Teracolus evenina* var. A. Trimen, S. Afr. Buttl., 3, p. 126 (1889).

Louw's Creek, September (Dr. L. Gough); Pienaars River (R. v. Jutrzenka); Komatipoort (G. W. Jeffery); Johannesburg (A. Ross), in Mus. Coll.; Warmbaths (H. L. L. Feltham); Potchefstroom and Lydenburg District (Morant and Ayres, teste Trimen).

233. *Teracolus agoye* (Wallengren).

Trimen, S. Afr. Buttl., 3, p. 98 (1889); Auriv., Rhop. Aeth., p. 439 (1898).

Anthopsycha agoye Wllgr., Lep. Rhop. Caffr., 15 (1857).

Lydenburg District (P. A. Krantz); Waterberg District (R. v. Jutrzenka), in Mus. Coll.; Pienaars River, March (W. L. Distant); Komatipoort (G. W. Jeffery); Warmbaths (H. L. L. Feltham); Marico and Limpopo Rivers (Selous, teste Trimen).

234. *Teracolus bowkeri* Trimen.

Trans. Ent. Soc. Lond., 1883, p. 358; S. Afr. Buttl., 3, p. 100, pl. 11, f. 4.

*Teracolus agoye bowkeri* Auriv., Rhop. Aeth., p. 439 (1898).

Johannesburg, November (A. Ross), in Mus. Coll.; Roodepoort, Melville, and Potchefstroom (H. L. L. Feltham).

235. *Teracolus antigone* (Boisduval).

Trimen, S. Afr. Buttl., 3, p. 148 (1889); Auriv., Rhop. Aeth., p. 440 (1898).

*Anthocharis antigone* Bsd., Sp. Gen. Lep., 1, p. 572 (1836).

Recorded from most parts of the Transvaal.

236. *Teracolus antigone phlegetonia* (Boisduval).

Auriv., Rhop. Aeth., p. 440 (1898).

*Anthocharis phlegetonia* Bsd., Sp. Gen. Lep., 1, 576 (1836).

*Teracolus phlegetonia* Trimen, S. Afr. Buttl., 3, p. 151 (1889).

Lydenburg District (P. A. Krantz); Komatipoort, December (Dr. H. G. Breyer); Waterberg District, January, Pienaars River, December (R. v. Jutrzenka), in Mus. Coll.; Marico and Limpopo Rivers (Selous, teste Trimen); Warmbaths (H. L. L. Feltham); Pretoria, October (W. L. Distant).

237. *Teracolus auxo* (Lucas).

Trimen, S. Afr. Buttl., 3, p. 120 (1889); Auriv., Rhop. Aeth., p. 442 (1898).

*Anthocharis auxo* Luc., Rev. et Mag. Zool., 1852, p. 422.

Lydenburg District (P. A. Krantz); Shilouvane, April (H. A. Junod); Krabbefontein, December (Dr. H. G. Breyer), in Mus. Coll.; Limpopo River and Marico River (Selous, teste Trimen); Pienaars River (R. v. Jutrzenka, teste W. L. Distant); Barberton (G. W. Jeffery).

238. *Teracolus subfasciatus* Swainson.

Zool. Illustr., (2) 3, pl. 115 (1833); Trimen, S. Afr. Buttl., 3, p. 92 (1889); Auriv., Rhop. Aeth., p. 443 (1898).

Recorded from most parts of the Transvaal, but does not seem to be common in any one locality.

GENUS *ERONIA*, *BOISDUVAL*.

Sp. Gen. Lep., 1, p. 604 (1836); Trimen, S. Afr. Buttl., 3, p. 169 (1889); Auriv., Rhop. Aeth., p. 444 (1898).

239. *Eronia cleodora* Hübner.

Samml. Exot. Schmett., 2, p. 130 (1822-1836); Trimen, S. Afr. Buttl., 3, p. 171 (1889); Auriv., Rhop. Aeth., p. 445 (1898).

Malalane, February, and Barberton, December (Gould), in Mus. Coll.; Nel River (H. L. L. Feltham); Barberton District (G. W. Jeffery).

240. *Eronia leda* (Boisduval).

Trimen, S. Afr. Buttl., 3, p. 174 (1889); Auriv., Rhop. Aeth., p. 446 (1898).

*Dryas leda* Bsd., App. Voy. Del. Afr. Austr., p. 588 (1847).

Louw's Creek, September (Dr. L. Gough); Shilouvane (H. A. Junod), in Mus. Coll.; Lydenburg District (R. v. Jutrzencka, teste W. L. Distant); Barberton District (G. W. Jeffery).

241. *Eronia thalassina* (Boisduval).

Auriv., Rhop. Aeth., p. 447 (1898).

*Pieris thalassina* Bsd., Spec. Gen. Lep., 1, p. 443 (1836).

Blyde River, Lydenburg District, July (H. A. Junod), in Mus. Coll.

\* 242. *Eronia buqueti* (Boisduval).

Trimen, S. Afr. Buttl., 3, p. 177 (1889); Auriv., Rhop. Aeth., p. 447 (1898).

*Callidryas buqueti* Bsd., Sp. Gen. Lep., 1, p. 607 (1836).

Recorded by R. Trimen from the Transvaal; also from Barberton District by G. W. Jeffery.

GENUS *CATOPSILIA*, *HÜBNER*.

Verz. Bek. Schmett., p. 98 (1826); Auriv., Rhop. Aeth., p. 448 (1898).

*Callidryas* Trimen, S. Afr. Buttl., 3, p. 182 (1889).

243. *Catopsilia florella* (Fabricius).

Auriv., Rhop. Aeth., p. 449 (1898).

*Papilio florella* Fabr., Syst. Ent., p. 479 (1775).

*Callidryas florella* Trimen, S. Afr. Buttl., 3, p. 185 (1889).

Common everywhere.



## GENUS TERIAS, SWAINSON.

Zool. Illustr., text to pl. 22 (1820-21); Trimen, S. Afr. Buttl., 3, p. 10 (1889); Auriv., Rhop. Aeth., p. 450 (1898).

244. *Terias senegalensis* Boisduval.

Spec. Gen. Lep., 1, p. 672 (1836); Auriv., Rhop. Aeth., p. 451 (1898).

*Terias butleri* Trimen, S. Afr. Buttl., 3, p. 23 (1889).

Barberton, January, December (Gould), in Mus. Coll.; Buffelskloof, December (A. G. Cook).

245. *Terias senegalensis bisinuata* Butler.

Auriv., Rhop. Aeth., p. 451 (1898).

*Terias bisinuata* Butl., Ann. Mag. Nat. Hist., (4) 18, p. 485 (1876).

*Terias aethiopica* Trimen, S. Afr. Buttl., 3, p. 121 (1889).

Shilouvane, May, September (H. A. Junod); Barberton, December (Gould), in Mus. Coll.

246. *Terias floricola* (Boisduval).

Faune Ent. Madag., etc., p. 21 (1883); Trimen, S. Afr. Buttl., 3, p. 19 (1889); Auriv., Rhop. Aeth., p. 452 (1898).

Lydenburg District (P. A. Krantz); Shilouvane, September, October (H. A. Junod), in Mus. Coll.; White River (A. T. Cooke and H. L. L. Feltham).

247. *Terias desjardinsii regularis* Butler.

Auriv., Rhop. Aeth., p. 452 (1898).

*Terias regularis* Butl., Ann. Mag. Nat. Hist., (4) 18, p. 486 (1876); Trimen, S. Afr. Buttl., 3, p. 26 (1889).

Barberton, January (Gould); Shilouvane, March (H. A. Junod), in Mus. Coll.

248. *Terias desjardinsii marshalli* Butler.

Auriv., Rhop. Aeth., p. 453 (1898).

*Terias marshalli* Butl., Ann. Mag. Nat. Hist., (7) 1, p. 62 (1898).

*Terias desjardinsii* Trimen, S. Afr. Buttl., 3, p. 24 (1889).

Shilouvane, May, April, June (H. A. Junod); Louw's Creek, September (Dr. L. Gough); Waterval Onder, April (A. Ross), in Mus. Coll.; Lydenburg District (Ayres and Ortlepp, teste Trimen); Barberton (G. W. Jeffery).

249. *Terias brigitta* (Cramer).

Trimen, S. Afr. Buttl., 3, p. 14 (1889); Auriv., Rhop. Aeth., p. 453 (1898).

*Papilio brigitta* Cr., Pap. Exot., p. 82, pl. 311, ff. B, C (1780).

Fairly common during the dry months.

250. *Terias brigitta* zoë Hopffer.

Mon. K. Ak. Wissensch. Berl., 1855, p. 640; Trimen, S. Afr. Buttl., 3, p. 16 (1889); Auriv., Rhop. Aeth., p. 453 (1898).

Common during the summer months.

GENUS *COLIAS*, *FABRICIUS*.

Illiger's Mag., 6, p. 284 (1807); Trimen, S. Afr. Buttl., 3, p. 163 (1889); Auriv., Rhop. Aeth., p. 454 (1898).

251. *Colias electra* (Linnaeus).

Trimen, S. Afr. Buttl., 3, p. 165 (1889).

*Papilio electra* Linn., Syst. Nat. edit., 12, p. 764 (1767).

*Colias electo* Auriv., Rhop. Aeth., p. 455 (1898).

Common throughout the Transvaal.

## FAMILY PAPILIONIDAE.

GENUS *PAPILIO*, *LINNAEUS*.

Syst. Nat. edit., 10, p. 448 (1758); Trimen, S. Afr. Buttl., 3, p. 194 (1889); Auriv., Rhop. Aeth., p. 457 (1898).

252. *Papilio cenea* Stoll.

Suppl. Cramer's Pap. Exot., p. 134, pl. 29, ff. 1, 1a (1791).

Trimen, S. Afr. Buttl., 3, p. 243 (1889); Auriv., Rhop. Aeth., p. 465 (1898).

Shilouvane, May (H. A. Junod); Barberton, December (Gould), in Mus. Coll.; Barberton (G. W. Jeffery).

253. *Papilio echerioides* Trimen.

Trans. Ent. Soc. Lond., 1868, p. 72, pl. 6, ff. 1, 2.

S. Afr. Buttl., 3, p. 255 (1889); Auriv., Rhop. Aeth., p. 468 (1898).

Lydenburg District (P. A. Krantz); Shilouvane (H. A. Junod); Waterval Onder, January (A. Ross); Malalane, February, and Barberton, December (Gould), in Mus. Coll.

254. *Papilio euphranor* Trimen.

Trans. Ent. Soc. Lond., 1868, p. 70, pl. 5, ff. 1, 2; S. Afr. Buttl., 3, p. 235 (1889); Auriv., Rhop. Aeth., p. 471 (1898).

Malalane, February (Gould), in Mus. Coll.; Lydenburg District (T. Ayres, teste R. Trimen).

255. *Papilio constantinus* Ward.

Ent. M. Mag., 8, p. 34 (1871); Trimen, S. Afr. Buttl., 3, p. 232 (1889); Auriv., Rhop. Aeth., p. 472 (1898).

Lydenburg District (P. A. Krantz); Barberton, December (Gould), in Mus. Coll.; Nelspruit, November (A. G. Cook, A. T. Cooke, and H. L. L. Feltham); Barberton (G. W. Jeffery); Lydenburg District (T. Ayres, teste R. Trimen).

256. *Papilio nireus lyaeus* Doubleday.

Auriv., Rhop. Aeth., p. 476 (1898).

*Papilio lyaeus* Doubl., Ann. Nat. Hist., 16, p. 178 (1845); Trimen, S. Afr. Buttl., 3, p. 237 (1889).

Rustenburg District (C. J. Swierstra); Waterval Onder, December (A. Ross); Barberton, December (Gould), in Mus. Coll.; Johannesburg, November (A. G. Cook and H. L. L. Feltham); Nelspruit and White River Settlement (A. T. Cooke).

257. *Papilio demoleus* Linnaeus.

Mus. Lud. Ulr. Reg., p. 214 (1764); Trimen, S. Afr. Buttl., 3, p. 223 (1889).

*Papilio demodocus* Auriv., Rhop. Aeth., p. 479 (1898).  
Common during summer.

258. *Papilio menestheus ophidicephalus* Oberthur.

Auriv., Rhop. Aeth., p. 479 (1898).

*Pap. ophidicephalus* Obert., Ent. d'ent., 3, p. 13 (1878); Trimen, S. Afr. Buttl., 3, p. 229 (1889).

Barberton, December, and Malalane, February (Gould); Lydenburg District (P. A. Krantz), in Mus. Coll.; Barberton, fairly common (Jeffery); Lydenburg District (T. Ayres, teste R. Trimen).

259. *Papilio corinneus* Bertolini.

Mem. Acad. Sci. Bologn., 1849, p. 9, pl. 1, ff. 1-3; Trimen, S. Afr. Buttl., 3, p. 217 (1889).

*Papilio pylades angolensis* Auriv., Rhop. Aeth., p. 481 (1898).

Fairly common during summer in the warmer parts of the Transvaal.

260. *Papilio leonidas* Fabricius.

Ent. Syst., 3, 1, p. 35 (1793); Trimen, S. Afr. Buttl., 3, p. 211 (1889); Auriv., Rhop. Aeth., p. 487 (1898).

Shilouvane, September (H. A. Junod); Barberton, December (Gould); id., March (G. W. Jeffery), in Mus. Coll.; White River (H. L. L. Feltham).

\* 261. *Papilio antheus* Cramer.

*Papilio* Exot., 3, 71, pl. 234, ff. B, C (1779); Trimen, S. Afr. Buttl., 3, p. 205 (1889); Auriv., Rhop. Aeth., p. 489 (1898).

Barberton, December (G. W. Jeffery).

\* 262. *Papilio porthaon* Hewitson.

Exot. Buttl. Pap., pl. 7, ff. 21, 22 (1865); Trimen, S. Afr. Buttl., 3, p. 207 (1889); Auriv., Rhop. Aeth., 491 (1898).

Barberton, December (G. W. Jeffery).

## FAMILY HESPERIDAE.

## SUB-FAMILY HESPERINAE.

## GENUS SARANGESA, MOORE.

Holland, Proc. Zool. Soc., 1896, 1, p. 4.

Pterygospidea, part, Trimen, S. Afr. Buttl., 3, p. 351 (1889).

263. *Sarangesa djaelaelae* (Wallengren).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 4.

Pterygospidea djaelaelae Wllgr., Lep. Rhop. Caffr., p. 54 (1857);  
Trimen, S. Afr. Buttl., 3, p. 354, pl. 12, f. 7 (1889).

Generally distributed.

264. *Sarangesa motozi* (Wallengren).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 7.

Pterygospidea motozi, Wllgr., Lep. Rhop. Caffr., p. 53 (1857);  
Trimen, S. Afr. Buttl., 3, p. 356 (1889).

Shilouvane, May (H. A. Junod), in Mus. Coll.; Pretoria and  
Barberton (W. L. Distant); Upper Limpopo (Selous, teste R.  
Trimen); Nelspruit, November (A. G. Cook); Barberton (G. W.  
Jeffery).

265. *Sarangesa motozioides* Holland.

Ann. Mag. Nat. Hist., (6) 10, p. 288 (1892); Ent. News, January  
1894, pl. 1, f. 5, female; Proc. Zool. Soc. Lond., 1896, 1, p. 7.

Barberton, December (Gould), in Mus. Coll.

\* 266. *Sarangesa pertusa* (Mabille).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 8.

Sape pertusa Mab., C. R. Soc. Ent. Belg., 1891, p. 68.

Transvaal (teste Mabille).

\* 267. *Sarangesa bouvieri* (Mabille).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 8.

Pterygospidea bouvieri Mab., Bull. Soc. Zool. France, 1877,  
p. 239.

*Sarangesa motozioides* Holl., Ent. News, January, 1894, pl. 1,  
f. 4, male.

Johannesburg, Warmbaths, and White River (H. L. L.  
Feltham).

268. *Sarangesa kobela* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 11.

*Nisoniades kobela* Tr., Trans. Ent. Soc. Lond., (3) 2, p. 180  
(1864).

Pterygospidea kobela, S. Afr. Buttl., 3, p. 353 (1889).

Malalane, February (Gould), in Mus. Coll.; Lydenburg District  
(T. Ayres, teste R. Trimen); Barberton (G. W. Jeffery); id., January  
(W. L. Distant).



## GENUS CELOENORRHINUS, HÜBNER.

Holland, Proc. Zool. Soc., 1896, 1, p. 12.

Pterygospidea, part, Trimen, S. Afr. Buttl., 3, p. 351 (1889).

269. *Celoenorrhinus mokezi* (Wallengren).

Holland, Proc. Zool. Soc., 1896, 1, p. 15.

Pterygospidea mokezi, Wllgr., Lep. Rhop. Caffr., p. 54 (1857); Trimen, S. Afr. Buttl., 3, p. 358 (1889).

Barborton, March (Miss L. de Beer); id., January (Gould); Shilouvane, March (H. A. Junod), in Mus. Coll.; Lydenburg District (T. Ayres, teste R. Trimen); Shilouvane, per H. A. Junod (H. L. L. Feltham).

## GENUS TAGIADES, HÜBNER.

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 16.

Pterygospidea, part, Trimen, S. Afr. Buttl., 3, p. 351 (1889).

270. *Tagiades fesus* (Fabricius).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 16.

Papilio fesus Fabr., Spec. Ins., 2, p. 135 (1871).

Pterygospidea fesus Trim., S. Afr. Buttl., 3, p. 363 (1889).

Shilouvane, May (H. A. Junod); Barborton, February (Gould and G. W. Jeffery), in Mus. Coll.; Nelspruit (A. T. Cooke).

## GENUS EAGRIS, GUENÉ.

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 17.

Pterygospidea, part, Trimen, S. Afr. Buttl., 3, p. 351 (1889).

\* 271. *Eagris nottoana* (Wallengren).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 18.

Pterygospidea nottoana Wllgr., Lep. Rhop. Caffr., p. 54 (1857); Trimen, S. Afr. Buttl., 3, p. 360 (1889).

Nelspruit (A. T. Cooke).

## GENUS CAPRONA, WALLENGREN.

Lep. Rhop. Caffr., p. 51 (1857); Trimen, S. Afr. Buttl., 3, p. 346 (1889); Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 19.

272. *Caprona pillana* Wallengren.

Lep. Rhop. Caffr., p. 51 (1857); Trimen, S. Afr. Buttl., 3, p. 348, pl. 12, ff. 6, 6a (1889); Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 19.

Lydenburg District, 1896 (P. A. Krantz), in Mus. Coll.; Barborton District (G. W. Jeffery); Warmbaths, January (A. G. Cook).

273. *Caprona canopus* Trimen.

Trans. Ent. Soc. Lond., (3) 2, p. 180 (1864); S. Afr. Buttl., 3, p. 349 (1889); Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 19.

Shilouvane, April and October (H. A. Junod), in Mus. Coll.; Potchefstroom District (T. Ayres, teste R. Trimen).

GENUS ABANTIS, *HOPFFER*.

Mon. K. Ak. Wissensch. Berl., 1855, p. 643; Trimen, S. Afr. Buttl., 3, p. 335 (1889); Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 20.

274. *Abantis tettensis* Hopffer.

Mon. K. Ak. Wiss. Berl., 1855, p. 643; Trimen, S. Afr. Buttl., 3, p. 337 (1889); Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 20.

Pienaars River, February (R. v. Jutrzencka), in Mus. Coll.; Warmbaths, December (W. L. Distant).

275. *Abantis paradisea* (Butler).

Trimen, S. Afr. Buttl., 3, p. 342 (1889); Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 20.

*Leucochitonea paradisea* Butl., Tr. Ent. Soc. Lond., 1870, p. 499.

Shilouvane, May, September (H. A. Junod), in Mus. Coll.; Buffelskloof, December (A. G. Cook); Warmbaths (H. L. L. Feltham).

276. *Abantis venosa* Trimen.

S. Afr. Buttl., 3, p. 339 (1889); Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 21.

Shilouvane, May, September (H. A. Junod), in Mus. Coll.; Barberton (Palmer, teste R. Trimen); White River (A. T. Cooke); Shilouvane, per H. A. Junod (H. L. L. Feltham).

277. *Abantis levubu* (Wallengren).

Trimen, S. Afr. Buttl., 3, p. 345, pl. 12, f. 5 (1889); Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 22.

*Leucochitonea levubu* Wllgr., Lep. Rhop. Caffr., p. 52 (1857).

Lydenburg District (P. A. Krantz); Pienaars River, January (R. v. Jutrzencka), in Mus. Coll.; Upper Limpopo (Barber and Selous) and Potchefstroom (T. Ayres, teste R. Trimen); Waterberg District and Zoutpansberg (W. L. Distant); Buffelskloof (A. G. Cook).

GENUS HESPERIA, *FABRICIUS*.

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 22.

*Pyrgus* Trimen, S. Afr. Buttl., 3, p. 278 (1889).

278. *Hesperia vindex* (Cramer).

Papilio vindex Cr., Pap. Exot., 4, pl. 353, ff. G, H (1782).

Pyrgus vindex Trimen, S. Afr. Buttfl., 3, p. 280 (1889).

*Hesperia spio* Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 22.  
Common everywhere.

279. *Hesperia dromus* (Plöetz).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 23.

Pyrgus dromus Plöetz, Mitth. nat. Ver. Neu. Vorpomm, u. Rug., 1884, p. 6; Trimen, S. Afr. Buttfl., 3, p. 283 (1889).

Shilouvane, April, September (H. A. Junod); Barberton, December (Gould), in Mus. Coll.; Pretoria, February, March (W. L. Distant); Pretoria, December, and Warmbaths, January (A. G. Cook).

280. *Hesperia ferox* (Wallengren).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 23.

Syrictus ferox Wlgr., Wien. Ent. Monatschr., 1863, p. 137.

Pyrgus diomus, Trimen, S. Afr. Buttfl., 3, p. 287 (1889).

Common.

281. *Hesperia asterodia* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 24.

Pyrgus asterodia Trimen, Trans. Ent. Soc. Lond., (3) 2, p. 178 (1864); S. Afr. Buttfl., 3, p. 284 (1889).

Johannesburg, September, October (A. Ross); Waterval, September (A. J. T. Janse), in Mus. Coll.; Pretoria, September (W. L. Distant): Potchefstroom (Morant and Ayres, teste R. Trimen); Johannesburg (H. L. L. Feltham); id. February, and Witpoortje, December (A. G. Cook).

\* 282. *Hesperia transvaaliae* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 24.

Pyrgus transvaalica Trimen, S. Afr. Buttfl., 3, p. 286 (1889).

Potchefstroom District (T. Ayres, teste R. Trimen); De Kroon, March, Warmbaths, January, and Buffelskloof, December (A. G. Cook); Johannesburg and Warmbaths (H. L. L. Feltham).

\* 283. *Hesperia agylla* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 24.

Pyrgus agylla Trimen, S. Afr. Buttfl., 3, p. 286 (1889).

Johannesburg (H. L. L. Feltham).

284. *Hesperia mafa* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 24.

Pyrgus mafa Trimen, Tr. Ent. Soc. Lond., 1870, p. 386, pl. 6, f. 12; S. Afr. Buttfl., 3, p. 287 (1889).

A fairly common species.

285. *Hesperia secessus* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 25.

*Pyrgus secessus* Trimen, Proc. Zool. Soc. Lond., p. 102, pl. 9, f. 22.

Shilouvane (H. A. Junod); Barberton, December (Gould), in Mus. Coll.

GENUS CARCHARODUS, *HÜBNER*.

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 26.

286. *Carcharodus elma* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 26.

*Pyrgus elma* Trim., Trans. Ent. Soc. Lond., (3) 1, p. 288 (1866); S. Afr. Buttl., 3, p. 293 (1889).

Malalane, February, and Barberton, December (Gould), in Mus. Coll.; Potechefstroom District and Upper Limpopo (teste Trimen); Johannesburg, April (A. G. Cook and A. T. Cooke); Johannesburg, White River Settlement, and Warmbaths (H. L. L. Feltham).

GENUS ACLEROS, *MABILLE*.

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 28.

*Ancyloxypha* Trimen, S. Afr. Buttl., 3, p. 330 (1889).

287. *Acleros mackenii* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, 1, p. 29.

*Pamphila* (?) *mackenii* Trimen, Trans. Ent. Soc. Lond., 1868, p. 95, pl. 6, f. 8.

*Ancyloxypha mackenii*, Trimen, S. Afr. Buttl., 3, p. 331 (1889). Shilouvane (H. A. Junod), in Mus. Coll.

GENUS PAROSMODES, *HOLLAND*.

Proc. Zool. Soc. Lond., 1896, p. 45.

288. *Parosmodes morantii* Trimen.

Holland, Proc. Zool. Soc. Lond., 1896, p. 45.

*Pamphilia morantii*, Trimen, Tr. Ent. Soc. Lond., 1873, p. 122; S. Afr. Buttl., 3, p. 311, pl. 12, f. 3 (1889).

Shilouvane, March, August, September (H. A. Junod), in Mus. Coll.; Fountain Grove, Pretoria District (H. A. Fry, teste H. L. L. Feltham); Upper Limpopo (teste Trimen); Komatipoort (G. W. Jeffery).

\* 289. *Parosmodes icteria* (Mabille).

Holland, Proc. Zool. Soc. Lond., 1896, p. 45.

*Pamphila icteria* Mab., C. R. Soc. Ent. Belg., 35, p. clxxx (1821).

*Pamphila zimbaso* Trimen., Proc. Zool. Soc. Lond., 1896, p. 74, pl. 6, f. 17.

Transvaal (teste Mabille).



## GENUS CYCLOPIDES, HÜBNER.

Trimen, S. Afr. Buttl., 3, p. 264 (1889).

Holland, Proc. Zool. Soc. Lond., 1896, p. 48.

290. *Cyclopides metis* (Linnaeus).

Trimen, S. Afr. Buttl., 3, p. 266 (1889); Holland, Proc. Zool. Soc. Lond., 1896, p. 48.

Barborton, January (Gould); Shilouvane, March, April (H. A. Junod), in Mus. Coll.; Lydenburg District (T. Ayres, teste R. Trimén); Auckland Park, February (A. Ochse).

\* 291. *Cyclopides malgacha* (Boisduval).

Trimen, S. Afr. Buttl., 3, p. 268 (1889); Holland, Proc. Zool. Soc. Lond., 1896, p. 48.

Steropes malgacha Boisd., Faune Ent. Madag., p. 67 (1833).

Johannesburg, December, January (A. G. Cook).

292. *Cyclopides aegipan* Trimén.

Trans. Ent. Soc. Lond., 1868, p. 94, pl. 6, f. 9; S. Afr. Buttl., 3, p. 271 (1889); Holland, Proc. Zool. Soc. Lond., 1896, p. 48.

Waterval Boven, August (Rev. Tomlinson), in Mus. Coll.; Lydenburg District (T. Ayres, teste Trimén).

293. *Cyclopides willemi* (Wallengren).

Trimen, S. Afr. Buttl., 3, p. 273 (1889); Holland, Proc. Zool. Soc. Lond., 1896, p. 48.

Heteropterus willemi Willgr., Lep. Rhop. Caffr., p. 47 (1857).

Plat River, Waterberg District, March, and Wonderboompoort, January (C. J. Swierstra), in Mus. Coll.; Lydenburg District (T. Ayres, teste Trimén); Barborton (C. F. Palmer); Crocodile River (F. H. Barber); Marico River (F. C. Selous, teste R. Trimén); Pretoria, December, and Warmbaths, January (A. G. Cook); White River (A. T. Cooke); Fountain Grove, Pretoria District (H. L. L. Feltham).

294. *Cyclopides meninx* Trimén.

Trans. Ent. Soc. Lond., 1873, p. 221, pl. 1, f. 12; S. Afr. Buttl., 3, p. 272 (1889); Holland, Proc. Zool. Soc. Lond., 1896, p. 49.

Koedoespoort, Pretoria District, February (A. J. T. Janse); Wonderfontein, February (A. Ross), in Mus. Coll.; Potchefstroom (W. Marrant and T. Ayres, teste R. Trimén); Johannesburg, December (A. Ochse), id., and White River Settlement (H. L. L. Feltham); White River, December (A. G. Cook).

295. *Cyclopides tsita* Trimén.

Trans. Ent. Soc. Lond., 1870, p. 386, pl. 6, f. 13; S. Afr. Buttl., 3, p. 276 (1889); Holland, Proc. Zool. Soc. Lond., 1896, p. 50.

Fairly common almost everywhere in the Transvaal.

## GENUS KEDESTES, WATSON.

Proc. Zool. Soc. Lond., 1893, p. 96; Holland, Proc. Zool. Soc. Lond., 1896, p. 54.

296. *Kedestes lepenula* (Wallengren).

Holland, Proc. Zool. Soc. Lond., 1896, p. 54.

*Hesperia lepenula* Wllgr., Lep. Rhop. Caffr., p. 50 (1857).

*Thymelicus lepenula* Trimen, S. Afr. Buttl., 3, p. 300, pl. 11, f. 6 (1889).

Pienaars River, December (R. v. Jutrzencka), in Mus. Coll.; Potchefstroom (T. Ayres, teste R. Trimen); Warmbaths (H. L. L. Feltham); id., January (A. G. Cook).

297. *Kedestes macomo* (Trimen).

Holl., Proc. Zool. Soc. Lond., 1896, p. 55.

*Cyclopides macomo* Trimen, Trans. Ent. Soc. Lond., (3) 1, p. 405 (1862).

*Thymelicus macomo* Tr., S. Afr. Buttl., 3, p. 302 (1889).

Malalane, February, and Barberton, December (Gould), in Mus. Coll.; Barberton (G. W. Jeffery).

298. *Kedestes tucusa* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, p. 55.

*Pyrgus tucusa* Trimen, Trans. Ent. Soc. Lond., 1883, p. 359; S. Afr. Buttl., 3, p. 297 (1889).

Pretoria, January (C. J. Swierstra); Waterval Onder, December (A. Ross); Barberton (G. W. Jeffery), in Mus. Coll.; Rustenburg District (W. L. Distant); Johannesburg (A. T. Cooke and H. L. L. Feltham).

\* 299. *Kedestes mohozutza* (Wallengren).

Holland, Proc. Zool. Soc. Lond., 1896, p. 55.

*Hesperia mohozutza* Wllgr., Lep. Rhop. Caffr., p. 50 (1857); Trimen, S. Afr. Buttl., 3, p. 294 (1889).

Johannesburg (H. L. L. Feltham).

300. *Kedestes callicles* (Hewitson).

Holland, Proc. Zool. Soc. Lond., 1896, p. 55.

*Cyclopides callicles* Hew., Descript. one hundred new Hesp., p. 42 (1868).

*Pamphila callicles* Trimen, S. Afr. Buttl., 3, p. 309 (1889).

Pienaars River, January (R. v. Jutrzencka); Barberton, January (Gould), in Mus. Coll.; Pretoria District, February (W. L. Distant); Johannesburg (A. T. Cooke, teste H. L. L. Feltham); Nelspruit (A. T. Cooke); Warmbaths, January (A. G. Cook).

301. *Kedestes barberae* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, p. 56.

*Cyclopides barberae* Trimen, Trans. Ent. Soc. Lond., 1873, p. 120, pl. 1, f. 11; S. Afr. Buttfl., 3, p. 306 (1889).

Johannesburg, November (A. Ross), in Mus. Coll.; Johannesburg (H. L. L. Feltham), id., October, November, December (A. G. Cook).

302. *Kedestes wallengreni* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, p. 56.

*Thymelicus wallengreni* Trimen, Trans. Ent. Soc. Lond., 1883, p. 361; S. Afr. Buttfl., 3, p. 304, pl. 11, f. 7 (1889).

Johannesburg, January, and Waterval Onder, December (A. Ross), in Mus. Coll.; Johannesburg, January, Buffelskloof, December, and White River, December (A. G. Cook).

GENUS *GEGENES*, HÜBNER.

Holland, Proc. Zool. Soc. Lond., 1896, p. 58.

303. *Gegenes hottentota* (Latreille).

Holland, Proc. Zool. Soc. Lond., 1896, p. 58.

*Hesperia hottentota* Latr., Encycl. Meth., 9, p. 777 (1823).

*Pamphila hottentota* Trimen, S. Afr. Buttfl., 3, p. 314 (1889).

Common everywhere.

\* 304. *Gegenes* (?) *occulta* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, p. 59.

*Pamphila occulta* Trimen, Proc. Zool. Soc. Lond., 1891, p. 103.

Johannesburg, Crocodile River, south of Magaliesberg, and Warmbaths (H. L. L. Feltham); Johannesburg, April, and Warmbaths, April (A. G. Cook).

GENUS *PADRONA*, MOORE.

Holland, Proc. Zool. Soc. Lond., 1896, p. 59.

305. *Padrona zeno* (Trimen).

Holland, Proc. Zool. Soc. Lond., 1896, p. 59, pl. 3, f. 6.

*Pamphila zeno* Trimen, Trans. Ent. Soc. Lond., (3) 2, p. 179 (1864); S. Afr. Buttfl., 3, p. 313, pl. 12, f. 2 (1889).

Waterval Onder, December (A. Ross); Barberton, December (Gould); id., September (Miss De Beer); Shilouvane, March (H. A. Junod), in Mus. Coll.; Nelspruit (H. L. L. Feltham); White River (A. T. Cooke).

## GENUS CHAPRA, MOORE.

Holland, Proc. Zool. Soc. Lond., 1896, p. 60.

306. *Chapra mathias* (Fabricius).

Holland, Proc. Zool. Soc. Lond., 1896, p. 60.

*Hesperia mathias* F., Ent. Syst. Suppl., p. 433 (1798).

*Pamphila mohopaani* Trimen, S. Afr. Buttl., 3, p. 324 (1889).

Rooiplaat, Pretoria District, March (C. J. Swierstra); Barberton, December (Gould); Shilouvane, March (H. A. Junod), in Mus. Coll.; Johannesburg, January, Witpoortje, April, and Buffelskloof, December (A. G. Cook); Warmbaths (H. L. L. Feltham); Upper Limpopo (F. C. Selous, teste R. Trimen).

## GENUS PANARA, MOORE.

Holland, Proc. Zool. Soc. Lond., 1896, p. 62.

307. *Panara borbonica* (Boisduval).

Holl., Proc. Zool. Soc. Lond., 1896, p. 62.

*Hesperia borbonica* Bsd., Faune Ent. Mad.; p. 65, pl. 9, ff. 5, 6 (1833).

*Pamphila borbonica* Trimen, S. Afr. Buttl., 3, p. 322 (1889).

Lydenburg District (P. A. Krantz), in Mus. Coll.

## GENUS BAORIS, MOORE.

Holland, Proc. Zool. Soc. Lond., 1896, p. 66.

308. *Baoris lugens* (Hopffer).

Holl., Proc. Zool. Soc. Lond., 1896, p. 66.

*Pamphila lugens* Hopff., Monatsber. K. Ak. Wiss. Berl., 1855, p. 643; Trimen, S. Afr. Buttl., 3, p. 318 (1889).

Pieniaars River (R. v. Jutrzencka), in Mus. Coll.

309. *Baoris ayresii* (Trimen).

Holl., Proc. Zool. Soc. Lond., 1896, p. 72.

*Pamphila ayresii* Trimen, S. Afr. Buttl., 3, p. 321, pl. 12, f. 1 (1889).

Johannesburg, September (A. Ross); Shilouvane, September (H. A. Junod), in Mus. Coll.; Lydenburg District (T. Ayres, teste R. Trimen); Johannesburg, September, October, and Witpoortje, July (A. G. Cook); Johannesburg and White River Settlement (H. L. L. Feltham).

## GENUS PLATYLESCHES, HOLLAND.

Proc. Zool. Soc. Lond., 1896, p. 72.

310. *Platylesches moritili* (Wallengren).

Holl., Proc. Zool. Soc. Lond., 1896, p. 72.

*Hesperia moritili* Wlgr., Lep. Rhop. Caffr., p. 49 (1857).

*Pamphila moritili* Tr., S. Afr. Buttl., 3, p. 319, pl. 12, f. 4 (1889).

Common everywhere.



\* 311. *Platylesches amadhu* (Mabille).

Holl., Proc. Zool. Soc. Lond., 1896, p. 73, pl. 5, f. 11.  
 Pamphila amadhu Mab., C. R. Soc. Ent. Belg., 35, p. clxxviii  
 (1891).

Transvaal (teste Mabille).

## GENUS ATRITROPA, HOLLAND.

Proc. Zool. Soc. Lond., 1896, p. 92.

312. *Atritropa erinnys* (Trimen).

Holl., Proc. Zool. Soc. Lond., 1896, p. 93.  
 Pamphila erinnys Trimen, Trans. Ent. Soc. Lond., (3) 1, p. 290  
 (1861); S. Afr. Buttl., 3, p. 326 (1889).

Barberton, January (Gould), in Mus. Coll.

## GENUS RHOPALOCAMPTA, WALLENGREN.

Lep. Rhop. Caffr., p. 47 (1857); Holl., Proc. Zool. Soc. Lond.,  
 1896, p. 97.

313. *Rhopalocampta unicolor* (Mabille).

Holl., Proc. Zool. Soc. Lond., 1896, p. 97.  
 Ismene unicolour Mab., Ann. Soc. Ent. France, (5) 7, p. xxix  
 (1817).

Hesperia unicolor Trimen, S. Afr. Buttl., 3, p. 375 (1889).

Barberton, April (Miss De Beer); Shilouvane, April (H. A.  
 Junod), in Mus. Coll.

\* 314. *Rhopalocampta anchises* (Gerstächer).

Holl., Proc. Zool. Soc. Lond., 1896, p. 98.  
 Ismene anchises Gerst., Gliederth-Fauna d. Zansib.-Gebiet,  
 p. 374, pl. 15, ff. 6, 6a (1873).

Hesperia anchesis Trimen, S. Afr. Buttl., 3, p. 374 (1889).

Boksburg (A. G. Cook).

315. *Rhopalocampta forestan* (Cramer).

Holl., Proc. Zool. Soc. Lond., 1896, p. 98.

Papilio forestan Cr., Pap. Exot., 4, pl. 391, ff. E, F (1782).

Hesperia forestan Trimen, S. Afr. Buttl., 3, p. 368 (1889).

Shilouvane (H. A. Junod), in Mus. Coll.; Johannesburg, April  
 (A. G. Cook and A. T. Cooke); White River (A. T. Cooke); Warm-  
 baths (H. L. L. Feltham); Pretoria, April (W. L. Distant); Barber-  
 ton (R. Trimen and G. W. Jeffery).

316. *Rhopalocampta pisistratus* (Fabricius).

Holl., Proc. Zool. Soc. Lond., 1896, p. 99.

Hesperia pisistratus Fabr., Ent. Syst. 3, p. 345 (1793); Trimen,  
 S. Afr. Buttl., 3, p. 371, pl. 12, f. 10 (1889).

Generally distributed.

## NOTES ON SOME OF THE SPECIES.

2. *Danaïda chrysippus alcippus* (Cramer).—The Transvaal specimens have the white suffusion on the hindwing less developed than is the case in specimens from Natal.

3. *Danaïda chrysippus dorippus* (Klug).—A very rare species in South Africa. The only Transvaal specimen in the Museum Collection differs from the East African examples in the darker and duller ground colour, the much deeper black of the border and the white spots on forewing being smaller.

4. *Amauris niavius dominicanus* Trimen.—Restricted to the eastern and north-eastern parts of the Transvaal, and even there far from common.

6. *Amauris echeria* (Stoll).—With the variety albimaculata restricted to the eastern parts of the Transvaal.

8. *Melanitis leda* (Linnaeus).—A rare species in the higher parts of the Transvaal, but, according to Mr. G. W. Jeffery, common at Barberton.

11. *Mycalesis ena* Hewitson.—I had previously put the specimens in the Museum Collection as *M. (?) selousi*, on account of it differing from that species by its prominent ocelli and also in a few minor points. But after I have seen the remarks made by Mr. G. A. K. Marshall and Dr. Butler, as published in the Proc. Zool. Soc., 1898, p. 903, I am now almost certain that our specimens belong to the *Mycalesis ena* Hew., although I have not been able to compare them with the original description.

12. *Mycalesis safitza* Hewitson.—“Fairly common in the Barberton District” (G. W. Jeffery); Eastern Transvaal (Butler, Proc. Zool. Soc., 1898).

14. *Henotesia perspicua* Butler.—Fairly common in the eastern and northern parts of the Transvaal; also from Crocodile River, south of Magaliesberg (teste H. L. L. Feltham). “Very common in the Barberton District.”—G. W. Jeffery.

15. *Henotesia perspicua simonsii* Butler.—I have followed Marshall, Trans. Ent. Soc. Lond., 1896, p. 562, in treating *H. simonsii* as a form of *H. perspicua*.

16. *Meneris tulbaghia* (Linnaeus).—Mr. A. T. Cooke writes:—“The latest date I have known it to be taken was 20th April.”

24. *Pseudonympha cassius* (Godt.).—Shilouvane specimens from H. A. Junod, also in Mr. H. L. L. Feltham’s collection.

34. *Acraea burni* Butler.—“Nelspruit, very local. These are found sailing round and round the trees by the Crocodile River, and are easy of capture.”—A. T. Cooke.

“I have seen one taken by Mr. Ochse at Bertrams, Johannesburg.”—H. L. L. Feltham.

36. *Acraea neobule* Doubleday.—Fairly common all through the Transvaal.

41. *Acraea asema* Hewitson.—Mr. H. L. L. Feltham considers two specimens—a male and female—in his collection, which he received from Rev. H. A. Junod, and labelled Shilouvane, “undoubtedly *A. asema* Hew.” Whether *A. asema* is not a form of *A. violarum*, as already hinted at by Aurivillius, I would prefer to leave an open question till such time when we possess more material from different localities. Mr. Trimen, S. Afr. Buttl., 1, p. 26, has

also drawn attention to this, where he remarks "that every marking in *A. asema* corresponds closely in form and position with those of the totally different looking, very strongly marked, and richly coloured *A. violarum* Bsd.; and, curiously enough, a precisely similar alteration occurs in the sub-marginal series of the forewing, being crescentic instead of rounded."

The following remarks on specimens in the Museum Collection point in the same direction:—

Three males in the Museum Collection from Umtali, South-East Rhodesia, agree in all respects with the description by Trimen of *A. asema* Hew. Specimens from Potgietersrust, Krabbefontein, and Shilouvane, although coming near to *A. asema* Hew., at the same time exhibit distinctly their near relationship to *A. violarum* Bsd., by their size and general colour. They also show the same aberration as referred to by Trimen. One specimen, from Shilouvane, has got the spots and margins quite as much developed as in *A. violarum* Bsd., but is not so brightly coloured, neither are the spots so intensively black as in typical *violarum*. Two species from Potgietersrust, on the other hand, I would have considered to be *A. asema* Hew., but for their colour, which, although not as bright as in *violarum*, is distinctly *not* semitransparent, and more ochre-reddish than ochre-yellowish.

47. *Acraea aglaonice* Westw.—"Have taken this right through the summer and winter."—A. T. Cooke.

"Quite common in some seasons, even flying in the main streets of Johannesburg."—H. L. L. Feltham.

"Common in the Barberton District."—G. W. Jeffery.

48. *Acraea axina* Westw.—"Both in winter and summer near Warmbaths."—H. L. L. Feltham.

Genus *Precis* Hübn.—I have followed Aurivillius, including *Junonia*, in this genus.

72. *Precis archesia pelasgis* (Godt.).—"In the two very wet seasons of 1893 and 1909 I have noticed this variety to be particularly more abundant than it is in ordinary seasons."—H. L. L. Feltham.

77-79. *Hypolimnas misippus* (Linnaeus).—"All three forms of females are found at Johannesburg in fine gradations. *Inaria* and *misippus* proper are the most abundant. It may be remarked that the forms *alcippus* and *dorippus* are specially rare—*dorippus* especially so. I have only taken one *dorippus*."—H. L. L. Feltham.

96. *Charaxes etheocles chanleri* Holl.—"The form found at Warmbaths, and probably throughout the Bushveld, appears to me to be nearest to that described as *C. etheocles etheocles* (Rothschild) form *Chandleri* Holl., and is more like *C. ephyra* of Godart. No doubt the Bushveld specimens differ in size and markings very markedly from *ethalion*, from Natal and the coast belt."—H. L. L. Feltham.

After carefully comparing the Museum specimens with Rothschild's description, I have no doubt that Mr. Feltham is correct, although I cannot fall in with his suggestion that this form is more like *Ch. ephyra* Godart. The specimens in the Museum Collection have on the forewing *above*, at least, two postdiscal spots, and with the marginal spots at least fairly large; by no means small or nearly absent as is the case in *Ch. ephyra* Godt.



125. *Spindasis natalensis* Doubl. and Hew.—The Transvaal specimens all exhibit the full development of the ochre-yellow markings of forewing, while in the Natal examples every gradation, from uniform fuscous to the full development, occurs. The Cape Colony specimens do not exhibit the full development. The fuscous of forewing inclining to blackish, the blue much brighter than in the Transvaal specimens.

127. *Spindasis ella* (Hewit.)—In the Transvaal specimens there seems to occur two well-marked seasonal phases. The dry phase, with the ochre-yellow bands on upperside of forewing, stronger developed than in the wet phase; the ground colour of the underside of both wings, which is in the wet phase yellowish, is in the dry phase of a sandy brown colour, with the markings less conspicuous. The Museum specimens from Natal exhibit the same seasonal differences.

129. *Axiocerses harpax* (Fabr.)—The two males from Waterval Onder exhibit a variety in which the upperside is dull orange-red, with dull brown-black borders, giving them rather a smoky appearance. The underside is also of a duller colour, and the golden spots not as brilliant as in typical *A. harpax* from the Transvaal.

The four males from Bandolierkop and Woodbush respectively represent the dry phase of this species. They are much smaller than the average dry phase specimens, with the borders on upperside not as wide, while the spots are more distinct; the underside pale sandy brown, and with the golden spots in hindwing very much reduced.

138. *Zeritis thyra* (Linn.)—The four males from Shilouvane, Zoutpansberg District, differ from typical *thyra* from Cape Colony in the following points:—The orange-red of upperside is lighter, the border of forewing not as broad, while on the underside the markings in hindwing are of a more silvery white colour, the median streak in one specimen very distinct, more regularly dentated, not touching streak which closes cell; in others, all the markings are very much reduced. Cilia white interruptions very minute.

139. *Zeritis dentatis* Sw.—“This is one of the numerous forms of *Thyra*; a closely related form from Dordrecht, Cape Colony, has the same bright and extended field above, but the underneath marks are of the olive-brown form of field. There is again another form resembling this above, but going off in the direction of *simplex* below, also found at Johannesburg. If *thyra* is to be split up, then, in addition to the above distinct departures from the type, the melanic form from Knysna, Cape Colony, should be distinguished, and *Z. zilka* of Gross-Smith must stand as an independent species. Mr. Trimen, however, prefers to place it as a variation only of *Thyra*.”—H. L. L. Feltham.

With reference to my note on *Z. thyra* (Linn.), it is not at all impossible that Mr. Feltham is correct in considering this species a variety of *Z. thyra*. For the time being, however, I prefer to keep *Z. dentatis* (Sw.) as a distinct species until such time when more material is available, I am able by comparison of specimens from different localities, whether to treat it as a variety of *Z. thyra* (L.) or to consider it a distinct species.

142. *Zeritis damarensis* (Trim.)—These five specimens from Wonderboompoort agree in all respects with Trimen's description and figure. The female from Crocodilepoort resemble the males in upperside colour and markings.



143. *Zeritis taikosama* (Willgr.)—In the Museum Series the males show all gradations of development of the orange-yellow markings on upperside, viz., from a few orange-yellow scales only to a well-developed patch. In the females, the orange-yellow patch is still more developed, occupying in one specimen more than half the surface of the wings with the bases strongly suffused with paler orange-yellow.

Two males from Potgietersrust exhibit a well-marked white dot at end of cell on forewing.

157. *Lycaena marshalli* (Butl.)—"I occasionally find this in my own and friends' gardens where there are cultivated geraniums. I doubt its being wild here. I think it is introduced with geranium plants on which the larva feeds. I have bred it at Capetown on cultivated geranium. I believe it was introduced into Kimberley in the same way. I never took it out of town or away from a garden where geraniums grew."—H. L. L. Feltham.

"I thought for a long time that this was not a good species of Dr. Butler's. I understand, however, that Mr. A. D. Millar, of Durban, and other good Natal collectors consider it rightly separated from palemon (with the violet-tinted male); I have, however, since taken the paired sexes of Marshalli, which, I think, settles the matter."—H. L. L. Feltham.

*Lycaena asteris* Godt.—Although Mr. W. L. Distant, on the authority of Wallengren, mentions this species as being from the Transvaal, I have not included it in this list on the strength of Mr. Trimen's remark, *vide* S. Afr. Buttl., 2, p. 26, "The true asteris has not to my knowledge been found away from the Cape Peninsula, but it has a very close ally inhabiting various parts of the Colony," etc., and also as none of my correspondents has ever taken a specimen so far.

183. *Lycaena jefferyi* (Sw.)—Some time ago the Museum again received a few lepidoptera from the Barberton District, presented by G. W. Jeffery, F.E.S., amongst which was a fine female of *Lycaena jefferyi*, the male of which I described in the Transvaal Museum Annals, Vol. I, p. 176. It differs from the male in several points.

*Head*: Palpi, thorax, abdomen, and legs as in male.

*Wings*: Upperside brownish grey, with a dark violaceous blue disc, leaving fairly broad borders of ground colour.

*Forewing*: The streak closing cell more distinct, broader; a small postmedian spot of ground colour between veins 1 and 2.

*Hindwing*: The hind marginal black spot better developed, bordered on the inside by an orange-yellow spot. Cellular mark represented by a small spot of ground colour. Violaceous blue crossed by a postmedian row of five spots, of which the first is indistinct, and placed between veins 1 and 2.

*Underside*: Of a lighter greyish colour than male, with the markings whiter edged. Black hind marginal spot the same as in the male. Cilia as in male, but outwardly not as white.

This specimen was caught at Noordkaap, November, 1908.

187. *Lycaena tantalus* Trim.—“One specimen taken by Mr. A. T. Cooke. This specimen was submitted to Mr. Trimen and identified by him.”—H. L. L. Feltham.

201. *Mylothris rüppelli*, Koch.—The two Transvaal specimens from Shilouvane, Zoutpansberg District, are not as brightly coloured as the series in the Museum Collection from West Pondoland. They are also of smaller size. I am not aware of other localities, except the above in the Transvaal. W. L. Distant also records it from the same district.

217. *Teracolus eris* (Klug.)—The specimens from Bandolierskop represent an extreme form of the dry phase. The golden yellow apical spots are reduced to three very small greyish spots, while the whole apical patch is reddish brown with a violaceous gloss, which is strongest towards inner margin of same. In hindwing there is no trace of the hind marginal spots, while the costal band and inner hind marginal border of forewing are as well developed as in the wet phase of the species. Underside of hindwing and apical portion of forewing exhibit the red sand colour common to the dry phase of the Teracoli. The black spots on underside of forewing and the discoidal spot of hindwing are very much reduced.

220. *Teracolus ione phlegyas* Butl.—These five specimens from Komatipoort (Jeffery) are all females of the dry phase, one of which has the primaries light lemon yellow with the black spots crossing apical patch, better pronounced, while another specimen belongs to a form not yet described. Instead of a brighter orange-yellow apical patch, crossed with blackish spots, as figured by Miss Sharpe in her monograph of the Teracoli, plate 22, fig. 1a, this specimen has the apical patch reddish brown inwardly bordered by a fairly broad black band and crossed by five whitish spots between the veins. The veins crossing the black border are of the same colour as the apical patch. The underside does not differ from the typical wet phase females.

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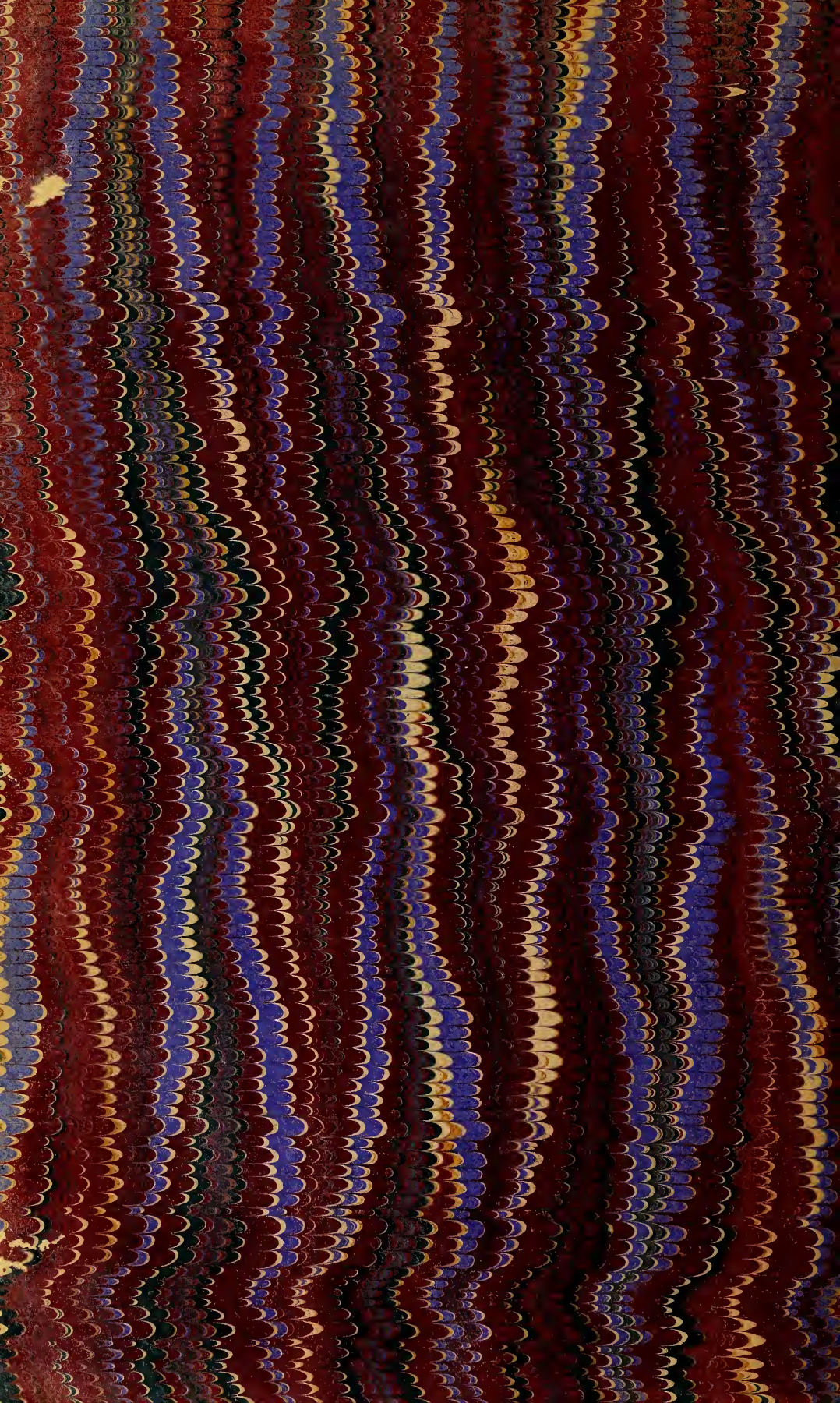


















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